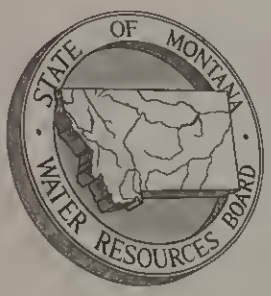
Water Resources Survey



Part I:

WATER AND RELATED LAND RESOURCES

and

Part II:

IRRIGATION DEVELOPMENT WITH MAPS SHOWING IRRIGATED AREAS IN COLORS DESIGNATING SOURCES OF SUPPLY

Dawson County, Montana

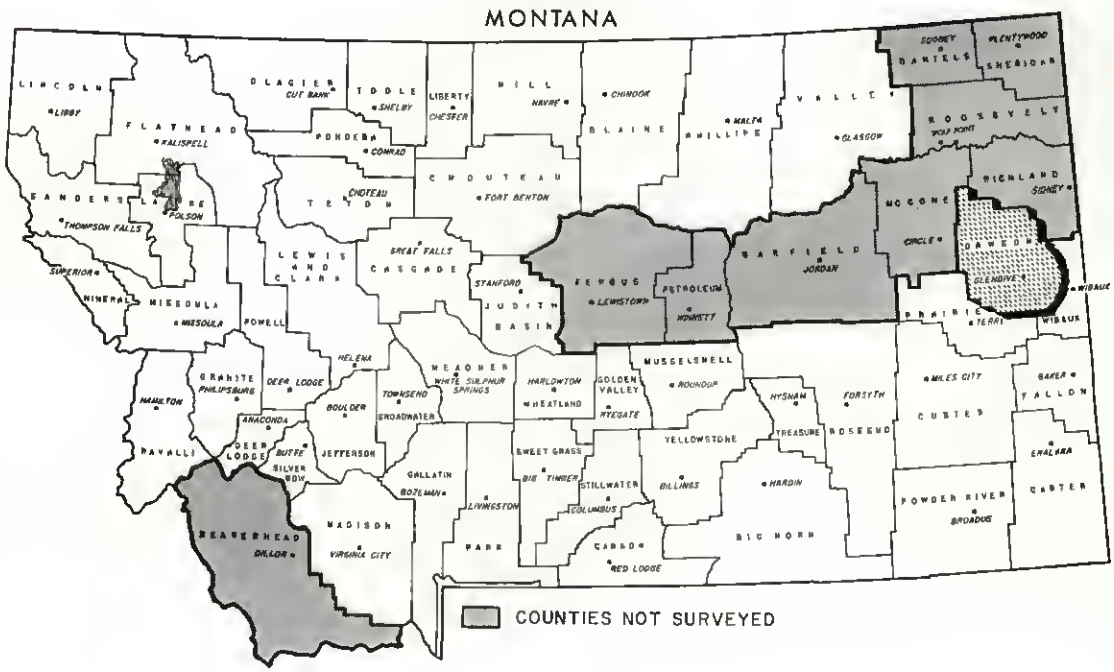
Published by
MONTANA WATER RESOURCES BOARD
Sam W. Mitchell Building
Helena, Montana 59601 — September, 1970
Telephone: 406/449-3648

WATER RESOURCES SURVEY

DAWSON COUNTY, MONTANA

PART I

Water and Related Land Resources



Published by

MONTANA WATER RESOURCES BOARD
Sam W. Mitchell Building
Helena, Montana 59601
September, 1970

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REPORTER PRTG. & SUPPLY CO.

September, 1970

The Honorable Forrest H. Anderson
Governor of Montana
State Capitol Building
Helena, Montana

Dear Governor Anderson:

Submitted herewith is a consolidated report on a survey of Water Resources for Dawson County, Montana.

The report is divided into two parts: Part I consists of history of land and water uses, and Part II contains the summary of water rights and irrigated lands, and the township maps in the County showing in colors the lands irrigated from each source of water supply.

Surveys have been made in the counties of Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, **Dawson**, Deer Lodge, Fallon, Flathead, Callatin, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Meagher, Mineral, Missoula, Musselshell, Park, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Rosebud, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wibaux, Wheatland and Yellowstone. Reports are available for all of the counties except a few of the ones which were surveyed a number of years ago and are now out of print. However, reports will again be published on these counties sometime in the future after they have been updated. Copies of these Water Resources Survey reports are available upon request to the Montana Water Resources Board.

The office files contain minute descriptions and details of each individual water right and land use, which are too voluminous to be included herein. These office files are available for inspection to those who are interested.

The historical data on water rights contained in these reports can never become obsolete. If new information is added from time to time as new developments occur, the records can always be kept current and up-to-date.

Respectfully submitted,
DOUGLAS G. SMITH, Director
Montana Water Resources Board

ACKNOWLEDGMENTS

A survey and study of water resources involves many phases of both field and office work in order to gather the necessary data to make the information complete and comprehensive. Appreciation of the splendid cooperation of various agencies and individuals who gave their time and assistance in aiding us in gathering the data for the preparation of this report is hereby acknowledged.

DAWSON COUNTY OFFICIALS

Don Gibson, Commissioner

Art Dietz, Commissioner — James F. Mortinson, Commissioner

Gordon W. Russell, Clerk and Recorder

C. C. Hatterscheid, Clerk of District Court — J. L. Stark, Assessor

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Torlief S. Aasheim.....Director, Montana Cooperative Extension Service

Dale D. Bergland.....County Extension Agent

Emmett Gardner.....Manager, Buffalo Rapids Irrigation Project

Victor Norlin.....Manager-Secretary, Lower Yellowstone Project
and Intake Project

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METHOD OF SURVEY

Water resources data contained in Part I and Part II of this report are obtained from courthouse records in conjunction with individual contacts with landowners. A survey of this type involves extensive detailed work in both the office and field to compile a comprehensive inventory of water rights as they apply to land and other uses.

The material of foremost importance used in conducting the survey is taken from the files of the county courthouse and the data required includes: landownership, water right records (decrees and appropriations), articles of incorporation of ditch companies and any other legal papers concerning the distribution and use of water. Deed records of landownership are reviewed and abstracts are checked for water right information when available.

Aerial photography is used by the survey to assure accuracy in mapping the land areas of water use and all the other detailed information which appears on the final colored township maps in Part II. Section and township locations are determined by the photogrammetric system, based on government land office survey plats, plane-table surveys, county maps and by "on-the-spot" location during the field survey. Noted on the photographs are the locations of each irrigation system, with the irrigated and irrigable land areas defined. All the information compiled on the aerial photo is transferred and drawn onto a final base map by means of aerial projection. From the base map, color separation maps are made and may include three to ten overlay separation plates, depending on the number of irrigation systems within the township.

Field forms are prepared for each landowner showing the name of the owner and operator, photo index number, a plat defining the ownership boundary, type of irrigation system, source of water supply and the total acreage irrigated and irrigable under each. All of the appropriated and decreed water rights that apply to each ownership are listed on the field forms with the description of intended place of use. During the field survey, all water rights listed on the field form are verified with the landowner. Whenever any doubt or complication exists in the use of a water right, deed records of the land are checked to determine the absolute right and use.

So far as known, this is the first survey of its kind ever attempted in the United States. The value of the work has become well substantiated in the counties completed to date by giving Montana its first accurate and verified information concerning its water rights and their use. New development of land for irrigation purposes by State and Federal agencies is not within the scope of this report. The facts presented are found at the time of completion of each survey and provide the items and figures from which a detailed analysis of water and land use can be made.

The historical data contained in these reports can never become obsolete. If new information is added from time to time as new developments occur, the records can always be kept current and up-to-date.

Complete data obtained from this survey cannot be included in this report as it would make the text too voluminous. However, if one should desire detailed information about any particular water right, lands irrigated, or the number and amount of water rights diverting from any particular stream, such information may be obtained by writing the Montana Water Resources Board in Helena.

Every effort is being made to ensure accuracy of the data collected rather than to speed up the work which might invite errors.

SURFACE WATER RIGHTS

Our concern over surface water rights in Montana is more than a century old. When the first Territorial Legislature, meeting in Bannack, adopted the common law of England on January 11, 1865, the Territory's legal profession assumed that it had adopted the Doctrine of Riparian Rights. This doctrine had evolved in England and in the eastern United States where the annual rainfall is generally more than twenty inches. It gave the owners of land bordering a stream the right to have that stream flow past their land undiminished in quantity and unaltered in quality and to use it for household and livestock purposes. The law restricted the use of water to riparian owners and forbade them to reduce appreciably the stream flow, but the early miners and ranchers in Montana favored the Doctrine of Prior Appropriation which permitted diversion and diminution of the streams. Consequently, the next day the legislature enacted another law which permitted diversion by both riparian and non-riparian owners. Whether or not this action provided Montana with one or two definitions of water rights was not settled until 1921 when the Montana Supreme Court in the Mettler vs. Ames Realty case declared the Doctrine of Prior Appropriation to be the valid Montana water right law. "Our conclusion," it said, "is that the common law doctrine of riparian rights has never prevailed in Montana since the enactment of the Bannack Statutes in 1865 and that it is unsuited to the conditions here . . ."

The appropriation right which originated in California was used by the forty-niners to divert water from the streams to placer mine gold. They applied to the water the same rules that they applied to their mining claims—first in time, first in right and limitation of the right by beneficial use. Those who came to Montana gulches brought with them these rules, applying them to agriculture as well as to mining.

The main points of consideration under the Doctrine of Prior Appropriation are:

1. The use of water may be acquired by both riparian and non-riparian landowners.

2. It allows diversion of water regardless of the reduction of the water supply in the stream.

3. The value of the right is determined by the priority of the appropriation; i.e., first in time is first in right.

4. The right is limited to the use of the water. Stream waters in Montana are the property of the State and the appropriator acquires only a right to their use. Moreover, this use must be beneficial.

5. A right to the use of water is considered property only in the sense that it can be bought or sold; its owner may not be deprived of it except by due process of law.

The State Legislature has provided methods for the acquisition, determination of priority and administration of the right. No right may be acquired on a stream without diversion of water and its application to a beneficial use. On unadjudicated streams, the Statutes stipulate that the diversion must be preceded by posting a notice at a point of intended diversion and by filing a copy of it within 20 days in the county clerk's office of the county in which the appropriation is being made. Construction of the means of diversion must begin within 40 days of the posting and continued with reasonable diligence to completion (Section 89-810 R.C.M. 1947). However, the Montana Supreme

Court has ruled that an appropriator who fails to comply with the Statutes may still acquire a right merely by digging a ditch and putting the water to beneficial use.

To obtain a water right on an adjudicated stream one must petition the District Court having jurisdiction over the stream for permission to make an appropriation. If the other appropriators do not object, the court gives its consent and issues a supplementary decree granting the right subject to the rights of the prior appropriators.

Montana laws do not require water users to file official records of the completion of their appropriations; therefore, it becomes advisable as soon as the demand for the waters of a stream becomes greater than its supply, to determine the rights and priorities of each user by means of an adjudication or water right suit. This action may be initiated by one or more of the appropriators who may make all the other claimants parties to the suit. The Judge of the District Court then examines all of the claims and issues a decree establishing priority of the right of each water user and the amount of water he is entitled to use. The court decree becomes in effect the deed of the appropriator to his water right.

Whenever scarcity of water in an adjudicated stream requires an allocation of the supply according to the priority of rights, the Judge, upon petition of the owners of at least 15 percent of the water rights affected, must appoint a water commissioner to distribute the water. Chapter No. 231, Montana Session Laws 1963, Senate Bill 55 amended Section 89-1001 R.C.M. 1947, to provide that a water commissioner be appointed to distribute decreed water rights by application of 15 percent of the owners of the water rights affected, or, under certain circumstances at the discretion of the Judge of the District Court—**"provided that when petitioners make proper showing they are not able to obtain the application of the owners of at least 15 percent of the water rights affected, and they are unable to obtain the water to which they are entitled, the Judge of the District Court having judisdiction may, in his discretion, appoint a water commissioner."** After the Commissioner has been appointed the Judge gives his instructions on how the water is to be apportioned and distributed in accordance with the full terms of the decree.

The recording of appropriations in local courthouses provides an incomplete record of the water rights on unadjudicated streams. In fact, the county records often bear little relation to the existing situation. Since the law places no restriction on the number or extent of the filings which may be made on an unadjudicated stream, the total amount of water claimed is frequently many times the available flow. There are numerous examples of streams becoming over appropriated. Once six appropriators each claimed all the water in Lyman Creek near Bozeman. Before the adjudication of claims to the waters of Prickley Pear Creek, 68 parties claimed thirty times its average flow of about 50 c.f.s. Today, the Big Hole River with an average flow of about 1,000 c.f.s. has filings totaling 173,912 c.f.s. One is unable to distinguish in the county courthouse the perfected rights from the unperfected ones since the law requires no official recording of the completion of an appropriation. Recognition by the courts of unrecorded appropriations adds to the incompleteness of these records. To further complicate the situation, appropriators have used different names for the same stream in their filings. In Montana, many of the streams flow through several counties; consequently, water right filings on those inter-county streams are found distributed in two or more county courthouses. Anyone desirous of determining appropriations on a certain river or creek finds it difficult and expensive to examine records in several places. In addition, the records are sometimes scattered because the original nine counties of 1865 have now increased to 56. As the original counties have

been divided and subdivided, the water right filings have frequently not been transcribed from the records of one county to the other. Thus, a record of an early appropriation in what is at present Powell County may be found in the courthouse of the original Deer Lodge County.

It can readily be seen that this system of recording offers little protection to rights in the use of water until they are determined by adjudication. In other words, an appropriator does not gain clear title to his water right until after adjudication, and then the title may not be clear because the Montana system of determining rights is also faulty. In the first place, adjudications are costly, sometimes extremely costly when they are prolonged for years. It is estimated that litigation over the Beaverhead River, which has lasted more than twenty years, has cost the residents of the valley nearly one-half million dollars. In the second place, unless the court seeks the advice of a competent irrigation engineer, the adjudication may be based upon inaccurate evidence; in the third place, if some claimant has been inadvertently left out of the action, the decree is not final and may be reopened for consideration by the aggrieved party. Another difficulty arises in determining the ownship of a water right when land under an adjudicated stream becomes subdivided in later years and the water is not apportioned to the land by deed or otherwise. There are no provisions made by law requiring the recording of specific water right ownership on deeds and abstracts.

The Legislative Session of 1957 passed Chapter 114 providing for the policing of water released from storage to be transmitted through a natural stream bed to the place of use. The owner of the storage must petition the court for the right to have the water policed from the storage reservoir to his place of use. If there are no objections the court may issue the right and appoint a water commissioner to distribute the water in accordance therewith. This law applies only to unadjudicated streams.

Administration of water on adjudicated streams is done by the District Court, but it has its drawbacks. The appointment of a water commissioner is often delayed until the shortage of water is acute and the court frequently finds it difficult to obtain a competent appointee for so temporary a position. The present administration of adjudicated streams which cross the county boundaries of judicial districts creates problems. Many of the water decrees stipulate head gates and measuring devices for proper water distribution, but in many instances the stipulation is not enforced, causing disagreement among water users.

Since a water right is considered property and may be bought and sold, the nature of water requires certain limitations in its use. One of the major difficulties encountered after an adjudication of a stream is the failure of the District Court to have control over the transfer of water rights from their designated places of use. The sale and leasing of water is becoming a common practice on many adjudicated streams and has created serious complications. By changing the water use to a different location, many of the remaining rights along the stream are disrupted, resulting in a complete breakdown of the purpose intended by the adjudication. Legal action necessary to correct this situation must be initiated by the injured parties as it is their responsibility and not that of the court.

In 1967, the Montana Legislative Assembly passed Section (89-813) Water Laws of Montana which states: "From and after July 1, 1967, the county clerk and recorder shall forward to the Montana Water Resources Board a copy of any instrument of water appropriation or any instrument transferring any water appropriation which is filed as provided in this section."

This means that copies of **all surface water filings** (appropriations) and copies of **all deed transfers** of water appropriations filed in the office of the county clerk and recorder on or after July 1,

1967, are to be forwarded to the Montana Water Resources Board, Sam W. Mitchell Building, Helena, Montana 59601.

At one time or another all of the Western Reclamation States have used similar methods of local regulation of water rights. Now all of them, except Montana, have more or less abandoned these practices and replaced them by a system of centralized state control such as the one adopted by the State of Wyoming. The key characteristics of the Wyoming system are the registration of both the initiation and completion of an appropriation in the State Engineer's office, the determination of rights and administration by a State Board of Control headed by the State Engineer. These methods give the Wyoming water users title to the use of water as definite and defensible as those which they have to their land.

When Montana began to negotiate the Yellowstone River Compact with Wyoming and North Dakota in 1939, the need for some definite information concerning our water and its use became apparent. The Legislature in 1939 passed a bill (Ch. 185) authorizing the collection of data pertaining to our uses of water and it is under this authority that the Water Resources Survey is being carried on. The purpose of this survey is: (1) to catalogue by counties in the office of the Montana Water Resources Board, all recorded, appropriated, and decreed water rights including the use rights as they are found; (2) to map the lands upon which the water is being used; (3) to provide the public with pertinent water right information on any stream, thereby assisting in any transaction involving water; (4) to help State and Federal agencies in pertinent matters; (5) to eliminate unnecessary court action in water right disputes; and (6) to have a complete inventory of our perfected water rights in case of need to defend these rights against the encroachments of downstream states, or Wyoming or Canada.

GROUNDWATER RIGHTS

Groundwater and surface water are often intimately related. In fact, it is difficult in some cases to consider one without the other. In times of heavy precipitation and surface runoff, water seeps below the land surface to recharge underground reservoirs which, in turn, discharge groundwater to streams and maintain their flow during dry periods. The amount of water stored underground is far greater than the amount of surface water in Montana, and, without seepage from underground sources it is probable that nearly all the streams in the state would cease to flow during dry periods.

It is believed that Montana's groundwater resources are vast and only partly developed. Yet, this resource is now undergoing accelerated development as the need for its use increases and economical energy for pumping becomes available. Continued rapid development without some regulation of its use would cause a depletion of groundwater in areas where the recharge is less than the withdrawal. Experience in other states has shown that once excessive use of groundwater in a specific area has started, it is nearly impossible to stop, and may result in painful economic readjustments for the inhabitants of the affected area.

Practical steps aimed at conserving groundwater resources as well as correcting related deficiencies in surface water laws became necessary in Montana. Prior to the Legislative Session of 1961, there was no legal method of appropriating groundwater, Proposed groundwater codes were introduced and rejected in four biennial sessions of the Montana Legislative Assembly—1951, 1953, 1955 and 1959.

In 1961, during the 37th Legislative Session, a bill was introduced and passed creating a Groundwater Code in Montana (Chapter 237, Revised Codes of Montana, 1961). This bill became effective as a law on January 1, 1962, with the State Engineer of Montana designated as "Administrator" to carry out provisions of the Act. However, the 1965 Legislature abolished the office of the State Engineer and transferred his duties to the State Water Conservation Board, affective July 1, 1965. On July 1, 1967, the name of the State Water Conservation Board was changed to the Montana Water Resources Board. Therefore, the Montana Water Resources Board became the "Administrator" of this Act.

Some of the important provisions contained in Montana's Groundwater Law are:

Section 1. DEFINITIONS OR REGULATIONS AS USED IN THE ACT.

(a) "Groundwater" means any fresh water under the surface of the land including the water under the bed of any stream, lake, reservoir, or other body of surface water. Fresh water shall be deemed to be the water fit for domestic, livestock, or agricultural use. The Administrator, after a notice of hearing, is authorized to fix definite standards for determining fresh water in any controlled groundwater area or subarea of the State.

(b) "Aquifer" means any underground geological structure or formation which is capable of yielding water or is capable of recharge.

(c) "Well" means any artificial opening or excavation in the ground, however made, by which groundwater can be obtained or through which it flows under natural pressures or is artificially withdrawn.

(d) "Beneficial use" means any economically or socially justifiable withdrawal or utilization of water.

(e) "Person" means any natural person, association, partnership, corporation, municipality, irrigation district, the State of Montana, or any political subdivision or agency thereof, and the United States or any agency thereof.

(f) "Administrator" means the Montana Water Resources Board of the State of Montana.

(g) "Groundwater area" means an area which, as nearly as known facts permit, may be designated so as to enclose a single distinct body of groundwater, which shall be described horizontally by surface description in all cases and which may be limited vertically by describing known geological formations, should conditions dictate this to be desirable. For the purpose of administration, large groundwater areas may be divided into convenient administrative units known as "subareas."

Section 2. RIGHT TO USE.

Rights to surface water where the date of appropriation precedes January 1, 1962, shall take priority over all prior or subsequent groundwater rights. The application of groundwater to a beneficial use prior to January 1, 1962, is hereby recognized as a water right. Beneficial use shall be the extent and limit of the appropriative right. As to appropriations of groundwater completed on and

after January 1, 1962, any and all rights must be based upon the filing provisions hereinafter set forth, and as between all appropriators of surface water or groundwater on and after January 1, 1962, the first in time is first in right.

Montana's Groundwater Code now provides for three different types of forms available for filing water rights, depending upon the nature of the groundwater development. The use of GW-4, Declaration of Vested Groundwater Rights, expired January 1, 1966.

Form GW-1, **"Notice of Appropriation of Groundwater"**—shall require answers to such questions as (1) the name and address of the appropriator; (2) the beneficial use for which the appropriation is made, including a description of the lands to be benefited if for irrigation; (3) the rate of use in gallons per minute of groundwater claimed; (4) the annual period (inclusive dates) of intended use; (5) the probable or intended date of first beneficial use; (6) the probable or intended date of commencement and completion of the well or wells; (7) the location, type, size, and depth of the well or wells contemplated; (8) the probable or estimated depth of the water table or artesian aquifer; (9) the name, address and license number of the driller engaged; and (10) such other similar information as may be useful in carrying out the policy of this Act. This form is optional but it has an advantage in that after filing the Notice of Appropriation, a person has 90 days in which to commence actual excavation and diligently prosecute construction of the well. Otherwise, failure to file the Notice of Appropriation deprives the appropriator of his right to relate the date of the appropriation back upon filing the Notice of Completion.

Form GW-2, **"Notice of Completion of Groundwater Appropriation by Means of Well"**—this form shall require answers to the same sort of questions as required by Form GW-1 (Notice of Appropriation of Groundwater), except that for the most part it shall inquire into accomplished facts concerning the well or means of withdrawal, including (a) information as to the static level of water in the casing or the shut-in pressure if the well flows naturally; (b) the capacity of the well in gallons per minute by pumping or natural flow; (c) the approximate drawdown or pumping level of the well; (d) the approximate surface elevation at the well head; (e) the casing record of the well; (f) the drilling log showing the character and thickness of all formations penetrated; (g) the depth to which the well is drilled and similar information.

It shall be the responsibility of the driller of each well to fill out the Form GW-2, "Notice of Completion of Groundwater Appropriation by Means of Well," for the appropriator, and the latter shall be responsible for its filing.

Form GW-3, **"Notice of Completion of Groundwater Appropriation Without Well"**—is for the benefit of persons obtaining (or desiring to obtain) groundwater without a well, such as by subirrigation or other natural processes so as to enable such persons to describe the means of using groundwater; to estimate the amount of water so used; and requiring such other information pertinent to this particular type of groundwater appropriation.

Montana's Groundwater Code provided for a period of four (4) years after January 1, 1962, for filing vested groundwater rights. The deadline for filing was December 31, 1965. A person did not automatically lose his vested groundwater rights by failure to file within the four-year period, but in the event of a future groundwater dispute, he would bear the burden of proving his rights in court.

It shall be recognized that all persons who have filed a Water Well Log Form as provided for under Sections 1 and 2 of Chapter 58, Session Laws of Montana, 1957, shall be considered as having complied with the requirements of this Act.

It is important to note that the groundwater law states, "UNTIL A NOTICE OF COMPLETION (Form GW-2 or GW-3) IS FILED WITH RESPECT TO ANY USE OF GROUNDWATER INSTITUTED AFTER JANUARY 1, 1962, NO RIGHT TO THAT USE OF WATER SHALL BE RECOGNIZED."

Copies of the forms used in filing on groundwater are available in the County Clerk and Recorder's Office in each of Montana's 56 counties. It shall be the duty of the County Clerk in every instance to record and file the original copy of the appropriation, transmit the second copy to the Administrator (Montana Water Resources Board) and the third copy to the Montana Bureau of Mines and Geology. A fourth copy is to be retained by the appropriator (person making the filing).

An accurate method of compiling data on the amount of water being used and the amount of water available for future use is essential in the administration and investigation of water resources. In areas where the water supply becomes critical, the groundwater law provides that the Administrator may define the boundaries of the aquifer and employ inspectors to enforce rules and regulations regarding withdrawals for the purpose of safeguarding the water supply and the rights of the appropriators. (See wording of the law for establishing a "controlled area.")

The filing of water right records in a central office under control of a responsible State agency provides an efficient means for the orderly development and preservation of our water supplies while protecting all appropriators.

HISTORY AND ORGANIZATION

Dawson County area, like many other areas of Montana, was first visited by members of the Lewis and Clark Expedition. Captain Clark on his journey down the Yellowstone River, during the summer of 1806, camped overnight near the present town of Glendive. About a year later Manuel Lisa and John Colter passed through the territory on their way to the mouth of the Bighorn River, where Lisa established a trading post.

In 1856, Sir George Gore, an Irish sportsman, guided by that famous frontierman Jim Bridger, followed the Yellowstone River on an eastward route to Fort Union.

For many years the vast territory of eastern Montana had been the hunting grounds and stronghold of various Indian tribes, and its fertile plains and bunch grass hills had been the feeding ground of innumerable herds of buffalo and great bands of elk, antelope and deer. After the buffalo had vanished, large stock outfits took possession of the open range between the Missouri and Yellowstone Rivers. Few of the stockmen ventured north of the Missouri River into old Dawson County because that country was filled with bands of roving Indians, and it was difficult to find suitable winter range.

Within a few years the military had established posts and occupied this virgin territory and the great bands of Indians that had made this area their stronghold soon were controlled. As the Indians became more peaceable, the settlers became more daring and confident, and settlements were established at greater distances from the military posts.

Among the first to settle in what is now Dawson County were George Grant and J. L. Burns on what is known as Burns Creek; the William Crane homestead on Crane Creek; and a man known only as "French Joe" who settled on Fox Creek. These men were located here in 1878 and it was more than two years before other settlers moved into the area.

One of the larger cattle outfits in this territory was the XIT brand of Texas. The XIT means "10 counties in Texas" which was an indication of the outfit's size on its home range. Another well known personality of early day fame in eastern Montana was George McCone. McCone was born in New York City in 1853 and had migrated West to the Indian Territory where he became a pony express rider. In the spring of 1882, McCone purchased 300 head of cattle at Boulder in Jefferson County and drove them back to his ranch on Burns Creek, 45 miles from Glendive.

When the route of the Northern Pacific Railway had been determined and it began its march westward, the town of Glendive was started and the first influx of settlers came into the county. About 1880 a number of settlers braved the dangers of the frontier and made settlements here. They were: Emmett Dunlap, George McCone, N. R. Brown, Henry Harpster, William Brake, Frank Fletcher, and Warren Sirrine. In 1881, when the railroad was completed to the town of Glendive, the town had reached the proportion of a small city. In a short time the population and wealth of the section had grown to such an extent that a county division and organization became a paramount question. While the county had been created for a great many years (January 15, 1869) no organization was ever effected, as it had been attached to Custer County for judicial and other purposes.

In September 1883, a bill was passed by the Legislative Assembly of the Territory of Montana, recreating the county of Dawson. This bill included extending the southern boundary line ten miles

south of the original line; providing for its organization by naming the county officers; and making Glendive the county seat. The original Dawson County was reduced in size to form all of Valley County in 1893; all of Richland and part of Wibaux in 1914; part of Prairie in 1915; part of McCone; and all of Garfield County in 1919.

When Glendive became the county seat, the building used as a courthouse was found to be too small and inadequate for the growing business of the new county. It was decided by the county commissioners to construct a new Dawson County courthouse at a cost of $25,000. This brick structure with jail accommodations was completed in 1885 and was at that time one of the finest courthouses in the State.

The year of 1883 also marked the end of the buffalo in this section of the Territory and the trade in buffalo hides and meat, one of the chief industries, was gone forever. The fertile plains which had been dotted with herds of buffalo and antelope became the feeding grounds for thousands of head of cattle and sheep. Almost before the settlers realized it, the Yellowstone Valley and Dawson County in particular, had become a stock raising area.

The stock industry suffered a setback when the severe winter of 1886-87 left thousands of head of stock dead on the frozen snow covered ranges of eastern Montana. Several years were to elapse before the stockmen recovered from the bad effect of that winter. This was a valuable lesson to the stockmen, and since that time, they have made provision for feeding their stock in the winter whenever it becomes necessary.

Settlement in Dawson County began within a short time after the Northern Pacific Railway completed its line across eastern Montana. From 1900 to 1916 almost every train coming west was filled with people from all over the world. Many of these people were from Norway, although a large number were American citizens from cities in the eastern United States. Entire colonies came from Poland and southern Germany. All of these people were looking for free land, some had visions of becoming rich raising wheat, but most of them were satisfied with having a home of their own.

For several years farming conditions were such that crops grew and people prospered, even those who knew little about farming were able to make a living from their land. But when the drought years struck, thousands lost all their savings and had nothing left but their land, which had been mortgaged to the limit of its value. This period of drought and depression occurred during the years 1919 to 1935 and saw many people who had homesteads leave their land and return to the cities or move to a more suitable farming country. Some of the land was taken over by the government and even more by the county as tax delinquent property. Since that time conditions have improved, with better farming methods developed and diversified farming practiced in agricultural areas of eastern Montana. The stockmen, although not as large as the outfits of the days of the "open range," are prospering with smaller herds in Dawson County.

The history of Dawson County would not be complete without some mention of the Yellowstone River and the thrills, worry, anxiety and benefits it gave the people who encountered it through the last 150 years. From the days of Lewis and Clark to the present time, the Yellowstone River has played an important part in the development of Montana.

Before Montana attained Statehood on September 8, 1889, boats of various kinds plied the Yellowstone River. However, when settlement reached the site of Clendive—Montana's Gate City—land

travelers found themselves confronted with the capricious Yellowstone River, sometimes slow and sluggish, and sometimes rampaging and devastating. To cross this river required some means of water transport.

As the white man had done so often, he copied the Indian type of boat and built a "bull boat." The construction of the boat began with the fashioning of a willow framework. This was covered with green buffalo hide with the hair turned to the inside. The boat was propelled by poles and since it water-logged easily, it was necessary to dry them often. Those persons who traveled any distance with this type of boat usually dried them each night. A bull boat could carry a load of about six or seven hundred pounds.

Dugout canoes were also used by the Indians and early settlers. This type of boat was hewed from a large cottonwood log. Often it was necessary to wire planks to the side of a dugout to keep them upright in the water. Later, settlers along the Yellowstone River built the more conventional type row boat.

The exact date is not known when a ferry was put into operation at Glendive, but it was thought to have been in 1881 with Douglas and Mead, early-day merchants, as the owners. At times when the ice on the river made trips impossible, a basket type conveyance was attached to the ferry cable in such a manner that it could be pulled above the water. Passengers taken on emergency trips in the "sky ride" describe it as a "dizzy" experience. The ferry was in use until the first bridge was built in 1895.

The first bridge built in 1895 had a draw span to accommodate steamboats which were still in use. Even though the railroad reached Glendive in 1881, steamboats were a regular sight on the river until 1906.

The first bridge did not have enough clearance, and on April 7, 1899, the ice piled up to such a height that the bridge was taken out. Before it was destroyed, the Glendive bridge had the distinction of being the largest wagon bridge in the entire northwest. A second bridge was completed for use in 1901. This bridge was not built with mechanized traffic in mind and another bridge was built in 1926 to replace it.

The bridge built in 1926 is still in use today but it is too narrow to accommodate the modern day flow of traffic. This necessitated the construction of a new modern bridge in 1958. Glendive now has two bridges spanning the Yellowstone River. This is quite a change from the first bull boats used to cross the river in the early times.

The town of Glendive is located in the center of the Williston Oil Basin. Development of the oil fields began in 1951 and may be considered as a basic and stable industry.

Among the active companies in the production of oil are the Shell and Texas Oil Companies. In 1955, the Butte Pipeline constructed a crude oil transmission pipeline to the eastern markets. Not only does the Glendive area abound in the production of oil, but Dawson County has unlimited reserves of lignite coal. The U. S. Department of Interior reports that this area contains one of the greatest sources of potential fuel and power in the nation. The area near Glendive is rich in uranium and a large deposit of bentonite south of the town has never been exploited. There is an abundance of gravel, sandstone, clay and burnt shale available in the county as building material.

Glendive is the focal point for the distribution of electric power in eastern Montana and western North Dakota. The Montana Dakota Utilities Company power plant is interconnected with eight major company plants and with the Bureau of Reclamation electric transmission system. Natural gas is available for residential, commercial and industrial purposes, a distinct asset for potential development of any new commercial or industrial endeavors. In 1969 Glendive had a population of 7,058 people. The only other town of any size and importance in Dawson County is Richey, a rural community of 480 people.

Agriculture has always been the dominant and stable industry in Dawson County, with its well diversified farms having irrigated and dry-land feed crops. The county also supports a large number of quality cattle on its large grazing areas. When its many resources are developed, Dawson County will become one of the foremost counties in the State.

CLIMATE

Located in eastern Montana near the North Dakota Border, much of Dawson County is situated in the Lower Yellowstone River Valley. Topography varies from the flat river bottom of the Yellowstone Valley to hilly terrain that is fairly rugged in places. The land slopes upward from the Yellowstone River into hilly country paralleling the river's northeastward course on both sides. The terrain west of the river rises higher than to the east.

The crests of the hills about 25 miles west of the river rise approximately 1,000 to 1,500 feet above the valley floor. East of the Yellowstone River the terrain is about 500 feet lower with the crests of the hills lying east of county boundaries. The highest point in the county is in the hills about 30 miles northwest of Glendive where the terrain rises to an elevation of 3,467 feet. The lowest area in Dawson County has an elevation of slightly less than 2,000 feet, and lies in the valley at the point where the Yellowstone River flows out of the county.

The area is drained by numerous small creeks, most of which become dry in the late summer. The Yellowstone River is the principal drainage, flowing northeastward through the southeastern portion of the county. The northwestern portion of the county drains into the Redwater River which flows northward to the Missouri River.

Dawson County is within an area having climate generally described as Continental, with cold winters, warm summers, and marked variation in seasonal precipitation. During a normal year about 80 percent of the annual precipitation will fall during the April-September growing season, and normally June is the wettest month by quite a margin, followed by July and May, respectively. Practically all of the area averages 12 to 14 inches of precipitation a year, with some of the higher terrain undoubtedly averaging slightly more. Winter snowfall is usually not heavy, averaging about 28 inches annually in the Yellowstone Valley with heavier amounts in the hills.

While annual snowfall averages are not large compared to the rest of the State, heavy snows do occur infrequently, usually in late winter or early spring. Summer precipitation usually occurs as showers, but steady, gentle rains can occur in May, June and September. Summer thundershowers are fairly frequent, and occasionally produce hail locally heavy enough to damage crops.

Winters, while quite cold, are not as severe as is thought by many. Some very cold weather can occur each winter, but these cold spells ordinarily last only a few days at a time. About once every 9 or 10 years the January or February temperature will average below zero. Relatively mild winter weather is not uncommon. However, periods of mild weather do not occur as frequently during the winter in Dawson County as in the counties to the west nearer the Rocky Mountains. In the spring the change from wintry to warmer weather is quite rapid, and the progressive cooling of the fall season is very noticeable during October and November.

Summers are characterized by warm weather which often lasts for weeks at a time. Sunny weather prevails 70 to 80 percent of the summer, with interruptions mostly during the afternoons from occasional showers and thunderstorms. A few days of hot weather occur almost every year, but hot spells seldom last more than a few days, and the hot weather seldom occurs with high humidity. Temperatures can reach highs of 90° or more during any month May-September, and on about half of the afternoons in July and August temperatures will reach 90° or warmer.

With cold winters and warm summers, the length of the growing season assumes importance, particularly as far as vegetative growth and harvest are concerned. The average length of season between spring and fall occurrences of 32°F. varies greatly in the county, from about 110 days in the hills up to more than 130 days in the Yellowstone Valley near Glendive.

Local flash flooding caused by sudden heavy thunderstorms can occur somewhere in the county about every two or three years. A more general type flood can develop during the late winter, following a cold spell, caused by ice jams when thawing begins upstream while freezing continues downstream. Here again this condition tends to localize itself and to recur at bridges, shallows, and other places where ice can become lodged and begin to pile up.

The following tables will provide a comparison in some elements between areas of the county:

PRECIPITATION

Station	Years of Record	Elevation	Yearly Average Total	Growing Season Average Total	Percent Falling in Growing Season	Wettest Year	Driest Year
Bloomfield 6E	1952-1968	2550	12.61	10.02	79	18.06 (1953)	8.62 (1960)
Glendive	1889-1968	2076	12.62*	9.79*	78	26.02 (1916)	4.83 (1934)
Lindsay	1951-1968	2681	13.11	10.03	77	18.84 (1962)	6.94 (1960)
Paxton	1923-1946	2400	12.25	9.79	80	18.31 (1927)	5.73 (1936)
Richey	1948-1968	2490	13.18	10.82	82	20.78 (1953)	8.26 (1952)

*1932-1961

TEMPERATURE

Station	Years of Record	Elevation	Highest and Year of Record	Lowest and Year of Record	January Average	July Average	Annual Average
Glendive	1889-1968	2076	117 (1893)	–50 (1936)	15.1°	74.8°	45.6°
Richey	1948-1968	2490	107 (1949)	–43 (1962)	11.3	69.7	41.8

°1932-1961

POTENTIAL IRRIGATION DEVELOPMENT

Glenn R. Smith, Soil Scientist
Dave R. Cawlfield, Consulting Soil Scientist

INTRODUCTION

The major features that determine the desirability of an area for irrigation development are kind of soil, availability and quality of irrigation water, the climate and markets. Soils, together with frost free season and mean temperature largely determine the ability of an area to produce, assuming that a dependable water supply is available and finally a market is necessary to obtain a profit from crops that are produced.

Land classification is the process by which soils, relief and climate are systematically appraised, and lands are placed in categories based on similarity of characteristics. Land classification surveys which are made by the Montana Water Resources Board are specifically designated to establish the degree of suitability of land for sustained irrigation farming. The objective is to outline the land areas that have a potential for irrigated agriculture projected to the year 2020. Technological advances in irrigation are taken into account. Therefore slope and surface topography becomes less important because of rapid expansion of sprinkler irrigation.

The land classification system used in the water resources survey separates the land areas into (1) lands having potential for irrigation termed "irrigable" in contrast to (2) the inferior "non-irrigable" lands which are unsuited for present or future irrigation because of unfavorable characteristics. The term "irrigable land" as used in this classification, includes land with soils, topography and drainage features that are suitable for irrigation by gravity or sprinkler methods. Lands classed as "irrigable" have soil, topography and climate that will support sustained irrigated agriculture.

Lands which are classified as "irrigable" are divided into classes on the basis of their relative suitability for irrigation farming. Class 1 represents irrigable land with potentially high productive value; class 2 represents land of intermediate value; and class 3 includes land of the lowest value that may be considered suitable for irrigation.

The intensity of this land classification is a general reconnaissance survey. **Any future project development should be based on a detailed study** to pinpoint the exact location and limits of the land best suited for irrigation.

MONTANA WATER RESOURCES BOARD

POTENTIAL IRRIGATION DEVELOPMENT
DAWSON COUNTY

COMPILED FROM DATA AVAILABLE AS OF DECEMBER 1, 1970

Compiled from U.S. Bureau of Reclamation & Soil Conservation Service Data, Aerial Photographs, U.S. Government Land Office Surveys & Field Investigations.

Soil Scientists: Glen Smith & Grant Jackson
Drafted by: Tom E. Yuhas, Hugh D. Greenup, & Daniel R. Erving

Scale
2 Mi. — 8 Mi.

N

EXPLANATION

- IRRIGABLE LAND CLASS 1
- IRRIGABLE LAND CLASS 2
- IRRIGABLE LAND CLASS 3
- PRESENTLY IRRIGATED LAND

Note: IRRIGABLE AREAS ARE MAPPED REGARDLESS OF AVAILABLE WATER SUPPLY.

Definition: IRRIGABLE LAND – LANDS CAPABLE OF BEING IRRIGATED BY GRAVITY OR SPRINKLER METHODS OF WATER APPLICATION.

R.50E. R.51E. R.52E. R.53E. R.54E. R.55E. R.56E. R.57E. R.58E.

T.23N. T.22N. T.21N. T.20N. T.19N. T.18N. T.17N. T.16N. T.15N. T.14N. T.13N.

RICHEY
BLOOMFIELD
INTAKE
RIMROD
LINDSAY
STIPEK
GLENDIVE
ALLARD
MAR-H

PHYSIOGRAPHIC FEATURES

Dawson County is in the residual plains area of southeast Montana. Glaciation extended into the north end of the county leaving a glacial till mantle on about four townships in the northwest part and there are a few glacial meltwater channels containing silty glacio-fluvial and some gravelly outwash along the northern border of the County. Other materials forming a mantle on parts of the land surface are old alluvial deposits on high terraces or benches associated with the Yellowstone River and recent alluvium on the floodplains and on fans where smaller streams enter the floodplains of the larger streams.

The principal drainage is the Yellowstone River which cuts through the county from southwest to northeast. The principal tributary streams that enter the Yellowstone River from the south are Box Elder Creek, Clendive Creek, Cedar Creek and Cabin Creek. Tributaries that enter the Yellowstone from the north and west are Burns Creek, Thirteen Mile Creek, Morgan Creek, Deer Creek, Seven Mile Creek, Clear Creek, Cracker Box Creek and Bad Route Creek. Approximately ten townships in the northwest part of the county drain into the Missouri River through the Redwater River.

The three principal physiographic areas are: (1) rolling to dissected uplands including soils from glacial till and alluvial deposits along smaller streams, (2) high benches occurring as islands within the rolling uplands and (3) floodplains along the Yellowstone River and the lower reaches of principal tributaries of the Yellowstone and along the Redwater River.

There are approximately 506,870 acres of land with soils that are potentially suitable for irrigation in Dawson County. Approximately 60 per cent of the potentially irrigable land is in the rolling uplands physiographic area. Less than 0.1 percent of this land is presently irrigated. Development of these soils for irrigation will depend upon (1) local project developments which could provide water for a small part of the irrigable soils or (2) development of distribution systems to transport water from the Yellowstone or Missouri Rivers to these higher lying and more remote areas.

About 38 percent of potentially irrigable land is on the high "benches" lying north and south of the Yellowstone River Valley and on the lower "benches" adjacent to the river valley. The benchlands have large acreages of irrigable class 1 and 2 land. The majority of the "benches" lie at elevations ranging from 200 to 400 feet above the valley floor. The high elevations above the existing water supply has limited the present land use to dry land wheat and rangeland. The size and scattered location of the individual benches will greatly increase costs of project development in this physiographic area.

Approximately 2 percent of the potentially irrigable land is on the floodplains of the Yellowstone River, the lower reaches of major tributaries of the Yellowstone and Redwater River. Approximately 90 percent of the 20,880 acres of presently irrigated land is in this physiographic area. This land is primarily on the floodplain of the Yellowstone River. The relative suitability of potentially irrigable land within this physiographic area varies widely. About 80 percent is in irrigable classes 1 and 2 and 20 percent is irrigable class 3. The physiographic area also includes extensive areas which are unsuited for sustained irrigation because of high salinity or alkalinity, poor drainage or coarse textured soils with very low water holding capacity.

SOILS RELATED TO IRRIGABLE LAND CLASSES

Soil profiles representing the irrigable land classes in each of the three physiographic areas are as follows:

Irrigable Class 1 Land: Representative profile of loam textured soil mainly on floodplains.

Typifying Soil Profile:

Ap	0″ - 7″	Light brownish gray loam, dark grayish brown moist; weak granular structure; soft, very friable, slightly sticky and slightly plastic; moderate effervescence, moderately alkaline (pH 8.4). (7 to 10 inches thick)
C1	7″ - 31″	Light brownish gray loam, grayish brown moist; massive but with evident stratification varying slightly in color and amount of silt and sand in loam; slightly hard, friable, slightly sticky and slightly plastic; moderate effervescence, moderately alkaline (pH 8.4); clear boundary. (20 to 60 inches thick)
C2	31″ - 58″	Light gray sandy loam, grayish brown moist; massive; soft, very friable, non-sticky and nonplastic; moderate effervescence, moderately alkaline (pH 8.1); clear boundary. (0 to 30 inches thick)
IIC3	58″ - 68″	Light gray sand and gravel; single grain; loose; slight effervescence.

Range in Characteristics: These soils have mean annual soil temperature of 47 degrees F. or more. The profile may be noncalcareous in surface layers. The texture below the Ap horizon is loam or light clay loam with between 18 to 35 percent clay and more than 15 percent fine and coarse sand. The profiles are nongravelly. Buried A1 horizons are common.

Irrigable Class 2 Land: Representative profile of the floodplains with a moderately fine textured soil without structure below the surface horizon.

Typifying Soil Profile:

Ap	0″ - 8″	Light olive gray clay loam, olive gray moist; moderate medium granular structure; very hard, friable, sticky and plastic; strong effervescence; abrupt boundary.
C	8″ - 60″	Light olive gray clay loam, olive gray moist; massive; very hard, friable, sticky and plastic, strong effervescence. (32 or more inches thick)

Range in Characteristics: These soils have mean annual temperature ranges from 48 to 50 degrees F. They are calcareous with only about 1 percent of segregated lime. Soil between 10 and 40 inches is usually stratified with textures of loam and light clay or silt loam and silty clay, or may be of uniform texture. Average clay percentage in the 10 to 40-inch depth ranges from 35 to 45.

Irrigable Class 1 Land: Represented by a soil of deep loam texture, and moderate to strong blocky structure located on the high benches and intermediate terraces.

Typifying Soil Profile:

Ap	0″ - 6″	Dark grayish brown loam, very dark grayisb brown when moist; moderate medium crumb structure; slightly hard, very friable, slightly sticky and slightly plastic; abrupt boundary.
B2t	6″ - 12″	Light brown clay loam, dark grayish brown when moist; strong fine and medium prisms breaking to moderate block structure; hard, friable, slightly sticky and slightly plastic; moderate continuous clay films with patches of thick clay films. Clear boundary.
B3	12″ - 15″	Light yellowish brown loam or sandy clay loam, olive brown when moist; moderate medium prismatic structure; slightly hard, very friable, nonsticky and nonplastic but with thin clay films on the ped faces. Clear boundary.
Cca	15″ - 36″	Light yellowish brown loam, olive brown when moist; moderate medium prismatic structure grading to massive in lower part; slightly hard, very friable, nonsticky and nonplastic; strongly calcareous with a few too many lime nodules. Gradual boundary.
C3	36″ - 60″	Light brownish gray loam, grayish brown when moist; stratified; slightly hard, very friable; slightly sticky and slightly plastic; strong calcareous.

Range in Characteristics: The texture of the surface soil is usually loam but deeply plowed areas may be clay loam in texture. The depth to sand or gravel ranges from 40 inches to more than 60 inches.

Setting: These soils occur on the high benchlands and on the intermediate terraces lying 50 to 100 feet above the floodplains.

Irrigable Class 2 Land: Representative profile of a loam textured soil with strong blocky structure and underlain by loose gravel or sand at 24″-40″. These lands occur on the high benches and intermediate terraces.

Typifying Soil Profile:

Ap	0″ - 6″	Grayish brown loam, very dark grayish brown moist; weak fine crumb structure; soft, very friable.
B2t	6″ - 14″	Brown clay loam, dark brown moist; strong medium prismatic structure separating to moderate medium blocks; very hard, friable, slightly sticky, slightly plastic; moderate thick clay films; clear boundary. (6 to 10 inches thick)

B3	14″ - 17″	Grayish brown heavy loam, dark grayish brown moist; weak medinm prismatic structure; hard, friable; thin patchy clay films, clear boundary. (2 to 4 inches thick)
C1ca	17″ - 30″	Light brownish gray loam, light olive brown moist; massive; hard, very friable, strongly calcareous with many soft masses of lime; abrnpt boundary. (6 to 16 inches thick)
C2ca	30″ - 32″	Light, brownish gray gravelly loam, light olive brown moist; massive; slightly hard, very friable; strongly calcareous with many masses of lime; abrupt boundary. (2 to 4 inches thick)
IIC3	32″ - 40″	Very gravelly sandy loam and loamy sand; moderately calcareous with lime crusts on gravels. (0 to 8 inches thick)
IIC4	40″ - 60″	Loose sands and gravels; calcareons.

Range in Characteristics: Loam is the dominant type; in deeply tilled fields, however, the texture of the surface soil is clay loam. Virgin profiles have an A1 horizon 2 to 4 inches thick, and an AB horizon, also of a loam texture, 3 to 5 inches thick. The B2 horizon has about 28 to 38 percent clay with an absolute increase of 5 to 10 percent over the Ap horizon and as much as 15 percent over the A1 horizon. The structure ranges from moderate to strong in grade in the B2 horizon. Thickness of solnm ranges from 12 to 20 inches. The Cca horizon is not as distinct in some profiles and lime may be accumulated in the upper part of the IIC horizon in the shallower range of the series. The depth to the sand and gravel substratum ranges from 20 to 40 inches. Colors are of dry soil unless otherwise stated.

Topography: Nearly level to sloping fans and terraces.

Drainage and Permeability: Well drained. The subsoil permeability is moderate.

Irrigable Class 3 Land: Representative profile of a moderately to slowly permeable clay textured soil of the floodplains with little or no salt or sodium in the soil.

Typifying Soil Profile:

Ap	0″ - 6″	Olive gray, silty clay, very dark gray moist; strong fine and very fine granular structure; very hard, friable, sticky and very plastic; weak effervescence; cracks are 1 to 3 inches wide and 8 to 18 inches apart; abrnpt wavy boundary. (6 to 10 inches thick)
Ac	6″ - 10″	Olive gray silty clay, very dark gray moist; strong very fine blocky structure separating to strong fine granules; extremely hard, firm, sticky and very plastic; weak effervescence 1 to 2 inch wide cracks; diffuse boundary.

C1 10" - 24" Olive gray silty clay, dark grayish brown moist; moderate fine blocky structure; extremely hard, firm, sticky and very plastic; stress or pressure cutans on surface of structural aggregates; 1/2 to 1 inch wide cracks; weak effervescence; diffuse boundary.

C2 24" - 42" Olive gray silty clay, olive gray moist, weak blocky structure in upper part and massive in lower part; extremely hard, firm, sticky and very plastic; some stress or pressnre cutans on surface nf structural aggregates and on vertical surfaces of 1/4 to 1/3 inch cracks; an occasional thin lens of heavy silty clay loam up to 2 inches thick; weak effervescence; diffuse boundary.

C3 42" - 60" Light olive gray silty clay, olive gray moist; massive extremely hard, firm, sticky and plastic, lenses of silty clay loam and light silty clay up to 2 inches thick and lenses of loam and silt loam less than 1 inch thick; few fine faint light yellowish brown dry, mottles; weak effervescence.

Range in Characteristics: The control section is silty clay or clay with a weighted average of about 52 percent clay but with a range from 46 to 60 percent clay, 40 to 50 percent silt plus very fine sand and 0 to 10 percent fine and coarse sand. Montmorillonite or expanding clay mixed with moderate amounts of montmorillonite is the dominant clay type having CEC of 60 tn 70 me/100 gm clay. The mean annual temperature is about 44 degrees F. but has a range of 42 to 47 degrees F. These soils are usually dry. The epipedon has moderate to strong grades of granular structure. The subsoils have massive or blocky (fragmental) structural aggregates and have weak to moderate effervescence. Occasional lenses up to 2 inches thick of coarser textured materials occur in some pedons at any depth below 24 inches, and contrasting materials occur between depths of 40 to 60 inches as phases.

Drainage and Permeability: Well and moderately well drained with slow infiltration. Permeability is slow to very slow.

Irrigable Class 3 Land: Represented by deep loamy fine sandy soils of the uplands and intermediate stream terraces.

Typifying Soil Profile:

A1 0" - 6" Dark grayish brown heavy fine sand, very dark grayish brown when moist; single grained, loose. Clear boundary.

6" - 14" Grayish brown, heavy loamy fine sand; dark grayish brown when moist; single grained; soft; loose weak effervescence with a few lime coated pebbles. Diffuse boundary.

14" - 60" Stratified loamy sands, loamy fine sands and fine sands, strongly calcareous.

SUMMARY

The 2,358 square miles of land in Dawson County is largely used for grazing by livestock. There

are approximately 602 square miles (385,300 acres) of cropland. Nearly 21,000 acres of this is irrigated and the remaining cropland is dry farmed with wheat and barley being grown in a crop-fallow system.

The expansion of irrigation can be accomplished in several areas, the most logical being the intermediate terraces and benches just above the Yellowstone Valley. These benches can be irrigated by 150′ to 200′ pumplifts either from the Yellowstone River or high line canals serving the presently irrigated valley lands.

The majority of the potential irrigable lands are in the rolling uplands. The irrigation of these areas will require high pumplifts and long canal systems for water delivery. The development of the high upland area may not be feasible for many years.

The small acreages of potential irrigable land in the alluvial deposited river and stream valleys may be developed by individual pumping from the streams or extension of present canal systems. The use of sprinkle irrigation should be considered for small isolated tracts of land.

It is anticipated that the expansion of irrigated agriculture in Dawson County will he developed by individual systems, and project development. Sprinkler irrigation may be the main method of irrigation. Whenever an area of irrigation development is anticipated, both a detailed land classification and drainage investigation should be completed prior to construction. The drainage survey will establish the cost of minimizing seepage and salinization of the soil. It shonld be remembered that whenever soil becomes seeped and strongly alkaline or saline to the point where crop production is curtailed, it may be a permanent waste of cropland.

The local federal and state agricultural agencies have soil surveys and experimental information available that will help determine areas for future irrigation and assist in management of presently irrigated land within Dawson County. Contacting these agencies for irrigation development information may save individual farmers money and labor and will also help conserve the land for future use.

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STREAM GAGING STATIONS

The U. S. Geological Survey measures the flow of streams, co-operating with funds supplied by several state and federal agencies. The results have been published yearly in book form by drainage basins in Water-Supply Papers through the year 1960. Beginning with 1961, the stream-flow records have been published annually by the U. S. Geological Survey for the entire state under the title, "Surface Water Records of Montana." Data for 1961-65 and subsequent five-year periods will be published in Water-Supply Papers. Prior to general issuance, advance copies of station records may be obtained from the U. S. Geological Survey. That agency's records and reports have been used in the preparation of this resume'.

Data given below cover the stream gaging records, which are available for Dawson County from the beginning of measurements through the water year 1969. The water year begins October 1 and ends September 30 of the following year.

Following are equivalents useful in converting from one unit of measurement to another:

(a) In Montana, one cubic foot per second equals 40 miner's inches.
(b) One acre-foot is the amount of water required to cover an acre one foot deep.
(c) One cubic foot per second will nearly equal two acre-feet (1.983) in 24 hours.
(d) A flow of 100 miner's inches will equal five acre-feet in 24 hours.
(e) One miner's inch flowing continuously for 30 days will cover one acre 1½ feet deep.

For reference purposes, the stream gaging stations are listed in downstream order.

Upper Sevenmile Creek near Glendive

The wire-weight gage was at Easton ranch 10 miles southwest of Glendive. The drainage area was not determined. Fragmentary records collected from March 1921 to May 1922 are considered to be of little value but do indicate that discharge ranged from an estimate of 2,040 c.f.s. on May 27, 1922 to no flow during the fall and winter of each year.

Yellowstone River at Glendive

The chain gage was located at the highway bridge at Glendive. The drainage area is 66,788 square miles. Records are available from October 1897 to December 1910 and October 1931 to September 1934. Records for this station are considered equivalent to records for Yellowstone River at Sidney (Richland County) except during periods of operation of Lower Yellowstone Canal at Lower Yellowstone Dam at Intake. The maximum discharge observed was 118,000 c.f.s. (June 8, 1909) and the minimum observed, 1,060 c.f.s. (Dec. 14, 1932). The average discharge for 16 years (1897-1910, 1931-34) was 13,900 c.f.s. or 10,060,000 acre-feet per year. The highest annual runoff was 14,200,000 acre-feet (1899) and the lowest, 4,388,000 acre-feet (1934). There is some regulation on tributary streams. There are diversions for irrigation of about 1,200,000 acres above the station.

Deer Creek near Glendive

The staff gage was 3 miles above the mouth and 5 miles northwest of Glendive. The drainage area was not determined. Fragmentary records collected from March 1921 to September 1922 are considered to be of little value but do indicate that discharge ranged from an estimate of 2,000 c.f.s. on June 19, 1921, to no flow at times.

Lower Yellowstone Canal at Lower Yellowstone Dam, at Intake*

The wire-weight gage is located at Lower Yellowstone diversion dam at Intake. Monthly and annual diversions in acre-feet are available from October 1908 to date (1969). The highest annual diversion was 387,200 acre-feet (1964) and the lowest, 18,600 acre-feet (1912). Records furnished by Bureau of Reclamation.

Partial Records Stations and Miscellaneous Discharge Measurements

In order to provide information on more streams than are covered by stream gaging stations, the U. S. Geological Survey has for several years been collecting some partial records. These are in addition to the miscellaneous discharge measurements which have always been reported. These partial records, when correlated with simultaneous discharges of nearby continuous-record stations, give fair indications of available flow.

There are five crest-stage partial-record stations in the Yellowstone River Basin in Dawson County. Stations are now (1969) being operated on Yellowstone River tributary No. 5 near Marsh, Griffith Creek near Glendive (discontinued 1967), Linden Creek at Intake, Indian Creek at Intake and War Dance Creek near Intake.

The partial-record stations as well as the miscellaneous discharge measurements are listed at the end of each U. S. Geological Survey Water-Supply Paper or Surface Water Records Report.

RESERVOIRS

There are no records published by the U. S. Geological Survey for reservoirs in Dawson County.

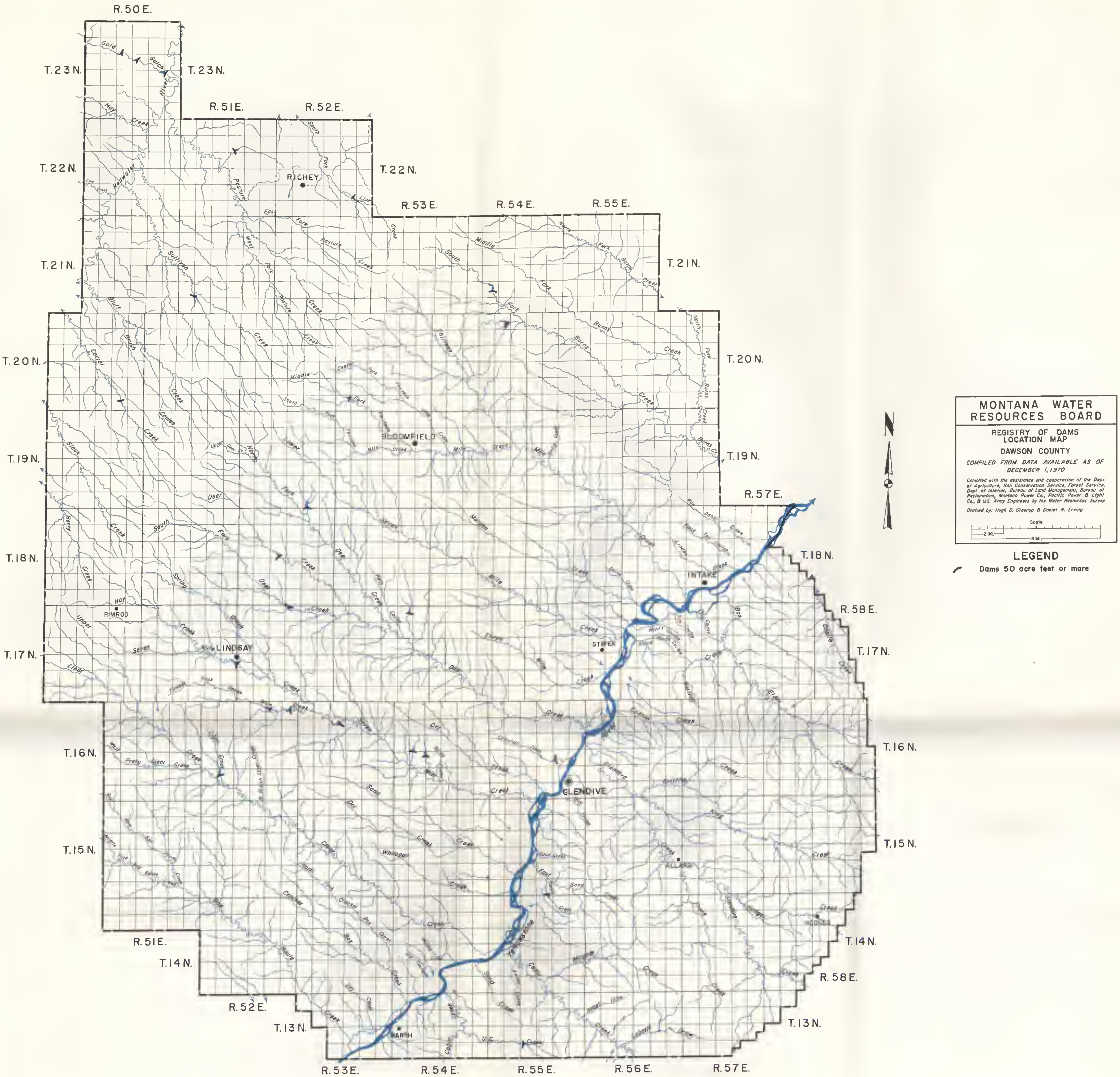
DAMS AND RESERVOIRS

The State of Montana has no statutes governing the design or construction of dams and, except for projects which the Montana Water Resources Board has constructed, the Board has no means of automatically obtaining information concerning design specifications, storage, capacities, locations, or ownerships of dams and reservoirs built throughout the State. Consequently, steps have been taken to make this information available for use by the State, the Federal Government, and private citizens.

By means of a questionaire, the Montana Water Resources Board recently obtained from the various federal agencies who design structures, the basic engineering data, locations, and ownerships of dams and reservoirs for which they either have, or had, responsibility and which have storage capacities of 50 acre-feet or more. The contributing federal agencies were the Soil Conservation Service, the Forest Service, the Bureau of Reclamation, and the Bureau of Land Management. The Montana Power Company also participated in the study.

Information on numerous dams and reservoirs constructed by private individuals in Montana is not available and is, therefore, omitted. However, the Board's Water Resources Survey crew, while working in Dawson County, obtained information on private dams and reservoirs within this county. The available information obtained from all sources was compiled by the Board for each county in the State and a list of dams and reservoirs which store 50 acre-feet or more of water was published.

*This station is now in operation (1969).


MONTANA WATER RESOURCES BOARD
REGISTRY OF DAMS LOCATION MAP
DAWSON COUNTY
COMPILED FROM DATA AVAILABLE AS OF DECEMBER 1, 1970
Compiled with the assistance and cooperation of the Dept. of Agriculture, Soil Conservation Service, Forest Service, Dept. of Interior, Bureau of Land Management, Bureau of Reclamation, Montana Power Co., Pacific Power & Light Co., & U.S. Army Engineers by the Water Resources Survey.
Drafted by: Hugh D. Greenup & Daniel R. Erving
Scale
2 Mi.
8 Mi.
LEGEND
Dams 50 acre feet or more
N
R. 50 E.
R. 51 E.
R. 52 E.
R. 53 E.
R. 54 E.
R. 55 E.
R. 56 E.
R. 57 E.
R. 58 E.
T. 23 N.
T. 22 N.
T. 21 N.
T. 20 N.
T. 19 N.
T. 18 N.
T. 17 N.
T. 16 N.
T. 15 N.
T. 14 N.
T. 13 N.
RICHEY
BLOOMFIELD
INTAKE
STIPEK
LINDSAY
RIMROD
GLENDIVE
ALLARD
MARSH
Gold Gulch
Hay Creek
Redwater
Sullivan
Pasture
East Fork Pasture Creek
West Fork Pasture Creek
South Middle North Fork Burns Creek
Burns Creek
Thirteen Mile Creek
Bluff
Brush
Corral
Coulee
Creek
Sioux
Berry
Deer Creek
Upper
Spring
Seven Mile Creek
Clear
Three Mile
Dry
Glendive Creek
Yellowstone
Whoopup
Box
Cracker Box Creek
Cabin
Sand Creek
Cedar
Elk
Deer

CROPS AND LIVESTOCK

Dawson County, Montana, is a fairly typical Eastern Montana county as far as agriculture is concerned. It consists of 1,509,120 acres. Of this total acreage 67,500 is federal land. Like most rural populations the number of farms has been declining over the past 30 years. Farms have increased in size due to mechanization which has been brought about due to the price cost ratio. The number of farms has changed from 792 in 1945 to 572 in 1964.

The average annual precipitation for the county is 12.73 inches, with an annual growing precipitation of 9.91. There is a great variation in the average growing season, with Glendive in the Yellowstone Valley having 139 days and Richey in the northern part of the county having 100 days.

AGRICULTURAL LAND USE

(Acres)

	1960
Dry Cropland	364,843
Irrigated Cropland	13,212
Range	1,010,487
Tame Pasture	24,000
Woodland (shelterbelts, river-bottom, etc.)	7,000
Irrigation Canals, drainage and highway construction	7,000
Urban expansion, rural living	7,100

LIVESTOCK PRODUCTION

	Number of Head
Beef Cattle	40,000
Sheep	20,000
Swine	2,000
Milk Cows	1,800

CROP PRODUCTION

	Acres	Estimated Value
Winter Wheat	100,000	$2,750,000
Spring Wheat	25,000	600,000
Barley	25,000	650,000
Durum Wheat	3,000	140,000
Oats	15,000	175,000
Sugar Beets	2,600	490,000
Corn	6,000	60,000
Rye	1,400	11,000
Dry Beans	900	50,000
Flax	2,000	50,000
Hay	35,000	600,000
Government Payments		2,000,000

GROUNDWATER

James E. Halloran, Groundwater Supervisor

PHYSIOGRAPHY AND STRUCTURE

At the surface of most of Dawson County lies the Tertiary Fort Union Formation; composed of sandstone, shales and coal beds. This generally flat-lying formation is incised by stream-cut valleys. Exposed along Cedar Creek are the old Cretaceous formations that have been folded upward and eroded away. The formations exposed, on the Cedar Creek Anticline, are the Hell Creek, Fox Hills and Bearpaw Shale. In the northern part of the county a discontinuous formation called the Flaxville Gravel forms a ridge between the Yellowstone and the Missouri drainage.

The most prominent structural feature is the Cedar Creek Anticline. This is a south-southeasterly trending, tight, asymmetrical fold in the formations that once were flat. The anticline extends from, and is tectonically associated with the Black Hills in South Dakota. The amount of structural relief from the crest of the anticline to the bottom of the Sheep Mountain Syncline is about 1,500 feet. The anticline which plunges to the north fades out completely a dozen or so miles northwest of Glendive.

Oil and gas production are some of the benefits derived from the anticline in Dawson County.

GEOLOGIC HISTORY

Starting from very early geologic time, eastern Montana was the site of relatively shallow sea deposition. There are marine limestone formations amounting to several thousands of feet in thickness as proof of long periods of submarine accretion of sediments. In these limestone strata are oil and gas accumulations. Thick beds of salt are intermittently found in this limestone sequence. The sedimentary record was interrupted several times by periods of erosion. Just prior to the first uplift of the Rockies, the Williston Basin and all of eastern Montana witnessed a thick deposition of marine shales and relatively thin sandstones. After the Rockies were formed in the west, the shallow seas drained to the east and most of the state became buried by eroded debris from the Rockies. These debris are now called Hell Creek, Fort Union and Flaxville Formations. The "Ice Ages" glaciated most of northern Montana. In the sedimentary record, as proof of the glacial ice, there may be found erratic granitic boulders that were carried by the ice from the Hudson Bay region of Canada. The glacier, as it moved south, pushed ahead or carried top soil from the north country and dropped the soil at its margin. Glacial Lake Glendive and glacial Lake Circle were formed as the glacier blocked the streams. Streams and melt water filled these pre-historic lakes. The glacier migrated up the Yellowstone valley to about where Intake is now located, and caused Lake Glendive to fill to a peak elevation of about 2,500 feet. Lake Circle's ice dam was situated irregularly from near the town of Redwater to Richey and backed water up to an approximate elevation of 2,600 feet. The easily eroded lake sediments consist of very thin bedded or varved clay and silts. As a result, most of this formation has disappeared and what remains is found only in the protected areas.

Before, during, and since the "Ice Ages," streams have been moving and depositing their sediment load of sand, silt, gravel and clay. Through millions of years this type of sediment has accumulated and is known as alluvium. The grain size of this deposited sediment is directly related to the velocity of the flow. Large particles such as gravel are deposited by swift water while smaller par-

ticles, namely silt and clay, can be moved and deposited by very slow currents. Most large streams, like the Yellowstone River, meander back and forth through their flood plain. By this process, the Yellowstone River through the ages, has produeed a valley from five to ten miles wide in plaees. Streams that meander can be expected to change their courses somewhat every year. This change may be hardly noticeable, or it may be of major economic and political importance. This changing of channels leaves the old stream gravel to be buried by finer sediments and then to be grown over by vegetation. These buried channels then become shallow, underground aquifers.

AVAILABILITY OF GROUNDWATER

The following is a description of the various formations with their groundwater use and potential. This study starts from the youngest and shallowest formation to the very oldest and deepest.

Alluvium

Recent sand and gravel found along many streams in the state are generally known for an abundance of groundwater. Quite often this water ean be reached by means of hand dug wells extending 10 to 30 feet below the surface. Water from the stream seeps into the gravel and sand and moves downstream in the alluvium. This water, after it has filtered through the sand for some distanee, loses its sediment and most of the disease bacteria. The circulation of groundwater is an important process in preventing it from becoming stagnant and strongly mineralized. Small ereeks, which are intermittent, often have a subsurface flow of fairly good water. Large valleys like the Yellowstone have deep wide valley fill and may have highly mineralized water in the deeper alluvium and good quality water at shallow depths elose to the river. Typical dissolved salts in the Yellowstone valley groundwater are calcium, magnesium, sodium sulfates and bicarbonates.

In Dawson County, there are economic quantities of groundwater in the alluvium along the Yellowstone River and Redwater River. A series of shallow wells in T. 15 N., R. 55 E. pump an estimated 600,000 gallons annually, from 25-30 feet. In the Redwater valley alluvium in NW¼NW¼ section 2, T. 22 N., R. 50 E. a well with a 20-foot static water level produees 20 gpm.

Glacial Lake Deposits

There are no reported wells completed in the glacial lake deposits and none are expected beease of the nature and continuity of the formation.

Older Alluvium

There are nine well developed stream terraces bordering the Yellowstone floodplain. These terraces are stream gravel deposits left by the Yellowstone River thousands of years ago, both before and after the ice ages. The terraces have been eroded away in some plaees, yet in other places they are quite prominent.[1] These stream terraces have flat to gently rolling surfaces. The soil on them is sandy with thick unconsolidated gravels underlying the soil. The sandy soil permits easy recharge of the underlying gravel. These porous and permeable gravels make excellent aquifers when they are recharged adequately. In some areas where the terraces are irrigated, the terrace aquifer is recharged by infiltration of canal water in addition to the natural recharge.

The nine reported terraees (counting the Flaxville and older)[2] along the Yellowstone valley range in height from 14 to 430 feet above the river. These unconsolidated deposits of gravel, sand, silt and

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[1] Torrey, A. E. and Kohout, F. A., 1956.
[2] Howard, A. D., 1960.

clay range in thickness from 0 to 30 feet. Yellowstone River gravels are characteristically well rounded pebbles and cobbles of quartzite and intrusive igneous rocks. Agate and petrified wood are common in these old gravels.

These gravels, deposited in a high energy environment, are by nature porous and permeable; and therefore, good potential aquifers. Their limited areal extent and inadequate recharge prohibit them from becoming major aquifers.

Torrey and Kohout reported that in Dawson County there are at least 17 wells and that in Richland County there are 258 wells completed in the terraces as of 1956. The water quality ranges from highly mineralized to satisfactory and is used for stock and domestic purposes.

Flaxville Gravel Formation

The Flaxville Gravel is the formation that makes up the caprock on all the divides between Fox Creek in Richland County and Bad Route Creek in southwestern Dawson County. This gravel caps the ridges. This is due to its porous and permeable nature that allows the water to be absorbed as in a sponge, instead of running off and eroding. The Flaxville is a fluvial gravel very similar to the sands and gravels in the present Yellowstone valley. In fact, according to Howard, the gravel is that of the ancestorial Yellowstone River.

By nature, the Flaxville Gravel should be a productive aquifer since it is porous and permeable. However, it yields little water for three reasons: (1) it covers only limited areas; (2) its permeable nature allows rapid percolation of water; and (3) it is not recharged to its capacity. On these mesas, the gravel caps are seldom wider than 5 miles nor longer than 15 miles. This means it is between 1 and 2½ miles to the outcrop. It is only recharged by precipitation in the late spring and early summer which percolates through the gravel to seep out as springs beneath the scarps. There is very little recharge in the winter and early spring because of the frozen ground, and in the late summer and fall seasons, there is little precipitation. For adequate recharge, there should be perennial streams crossing the gravel.

Most, if not all, of the water wells drilled into the Flaxville continue on into the Fort Union to yield water from both formations. (The Flaxville in this area is not thicker than 40 feet.) It is difficult to say just what a Flaxville well will yield by itself.

Fort Union Formation

The Fort Union Formation is present under approximately 85 percent of Dawson County. Its thickness varies from zero on the Cedar Creek Anticline to near 600 feet in the western part of the county.

Strata of the Fort Union are of continental origin. They represent an environment that may have been similar to that on the Mississippi delta today. It is thought that lowland swamps subsided to a point that the streams changed course and spilled out over the swamps. The streams flooded the swamps with sediment thereby burying the organic materials. This burial kept the plant debris from being oxidized or burned. A repetitious process like this could explain the cyclic nature of the repeated coal beds, shales and sandstones. Individual beds cannot be traced over great distances.

The Tertiary Fort Union Formation is the most widely used aquifer in Dawson County. Most of the water wells in the county are completed in the Fort Union. A well, drilled to one or two hundred feet, is almost certain to produce adequate water for stock and domestic needs. Sandstones and

MONTANA WATER RESOURCES BOARD

GROUNDWATER INVENTORY
DAWSON COUNTY

COMPILED FROM DATA AVAILABLE AS OF DECEMBER 1, 1970

Compiled from reports of U.S. Geological Survey, the Montana Bureau of Mines & Geology, and others.

Geologist: Jim Holloran
Drafted by: D.R. Braiby, Hugh D. Greenup, & Daniel R. Erving

Scale
2 Mi. — 8 Mi.

R.50E. R.51E. R.52E. R.53E. R.54E. R.55E. R.56E. R.57E. R.58E.

T.23N. T.22N. T.21N. T.20N. T.19N. T.18N. T.17N. T.16N. T.15N. T.14N. T.13N.

GLACIAL LAKE CIRCLE — GLACIAL LAKE GLENDIVE — GLACIAL LAKE STIPEK — GLACIAL LAKE INTAKE

RICHEY BLOOMFIELD RIMROD LINDSAY GLENDIVE STIPEK INTAKE HODGES MARSH

CEDAR CREEK ANTICLINE

EXPLANATION

	Qal	Alluvium - composed of silt, sand, clay and gravel; reportedly has a potential to supply yields of 5 to 150 gpm from saturated sands and gravels.
	Qt	Terrace Gravels - silt, sand and gravel of terrace remnants; yields of 5 to 500 gpm reported where gravel deposits are thick and recharge is available.
	Tf	Flaxville Gravels - small remnants of brown, yellow and gray gravel, sand and silt; unknown potential in Dawson County.
	Tfu	Fort Union - sandstone and shales with numerous seams of coal and scoria, widely utilized as an aquifer with yields of 2 to 30 gpm reported from shallow sandstone.
	Khc	Hell Creek - alternating sandstone and clay shales; upper part considered to be in hydraulic connection with overlying Fort Union, and lower part hydraulically connected with the underlying Fox Hills sandstone.
	Kfh	Fox Hills - gray to yellowish sandstone and sandy shales; yields of 2 to 200 gpm reported from sandstones. Generally, water is under artesian pressure.
	Kp	Pierre Shale - dark gray shale; not normally an aquifer.
		Shorelines of glacial Lake Glendive and glacial Lake Circle.
		Limit of glacier advance.
	S	Reported spring.

coal beds generally yield water; if not capping ridges, or too near their outcrop. This formation produces water from the porous sandstone, the very porous scoria beds, and the intensely fractured coal beds. The quantity of water that can be expected is usually from five to twenty gallons per minute. Water from the sandstones is often mineralized and the water from coal is frequently very pure and low in mineral content. In NW¼N½ section 34, T. 17 N., R. 55 E. there is reportedly a well 250 feet deep yielding 40 gpm. A shallower well, with a more typical yield, is found at C N½NE¼ section 26, T. 16 N., R. 58 E. It has a yield of 5 gpm and a static water level of 30 feet.

Hell Creek Formation

The Hell Creek Formation is uppermost Cretaceous in age. It consists of fresh water and brackish water sandstones, siltstones and shales. This formation is divided into two separate units. The upper unit is sandstones, gray siltstones and carbonaceous shales that are irregular and discontinuous. This unit is the thicker one, being about 600 feet thick.[3] In this interval, there are found abundant dinosaur fossils.

The lower unit is a light brown to green, medium to coarse-grained, cross-bedded sandstone about 100 feet thick. A distinguishing characteristic of this sandstone is the presence of one-inch diameter yellow concretions with black sooty cores. This Hell Creek sandstone and that of the underlying Fox Hills are in contact and form a thick, continuous aquifer. This aquifer supplies the groundwater for many wells southeast of the Yellowstone valley.

Most water wells producing from the Hell Creek Formation are near the Cedar Creek Anticline. Their average depth is less than 200 feet and a typical yield is about 8 gpm. There is an exceptionally good well reported in section 34, T. 14 N., R. 56 E. that has a 48-foot static water level in a 65-foot deep well and yields 25 gpm. The Hell Creek Formation becomes deeper and shalier to the north and is rarely used as a source of groundwater. The water is hard at shallow depths and soft in deeper areas. Wells tapping the Hell Creek Formation may flow in areas close to the Yellowstone River.

Fox Hills Formation

The Fox Hills Formation consists of fine-grained sandstones, siltstones and shales. This environment of deposition is believed to be marine to brackish. The upper member, the Colgate, is light gray sandstone. The lower member is medium-grained, light brown, yellow brown, or light green sandstone and some interbedded gray silty sandstones.

"The Fox Hills sandstone is probably the most important artesian horizon in this region."[4]

Flowing wells tapping the Fox Hills are rare in upland areas. The wells drilled into this formation in the valleys commonly flow. The depth to the Fox Hills varies from zero to about 1,000 feet. Its thickness ranges from 150 to 220 feet. The sandstones of the Fox Hills are water-bearing and yield soft water, which is desirable for domestic and stock usage. Drillers report the largest flows are found within 200 feet of the top of the Pierre Shale.

One well on the Cedar Creek Anticline, southwest of Glendive, is reported to yield 50 gpm with a static water level of 160 feet. Another well, a mile away, yields 10 gpm from a depth of 170 feet.

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[3] Taylor, O. J., 1965.
[4] Perry, E. S., 1935.

Most wells drilled into the Fox Hills and not on the anticline, produce water from one or more of the formations above Fox Hills.

Pierre Formation

The Pierre Shale is a medium blue-gray, massive, shale formation. Other lithologic features are: bentonite beds, large grayish to reddish limy concretions, prismatic clam shells, and sandy shale streaks. It has been reported to be as thick as 4,000 feet. There are no reported water wells producing from this shale formation.

Deeper Formations

There are deeper formations that have the potential of yielding water. These depths are usually not economically feasible for most agricultural and domestic needs. There is also the possibility that there may be no water, the water may be saline, or the water may be mixed with oil and gas in these formations.

WELLS

The oldest well reported in Dawson County was drilled in 1880 and was used for watering cattle. Eighty-two percent of the wells in this county have been drilled since 1940. The dominant use is for stock, representing 37 percent of all well uses. Approximately 1,208 wells have been reported on 719 groundwater appropriation forms on file with the Montana Water Resources Board, as of January 1, 1971. The following table shows total appropriations and well uses in Dawson County based on information on appropriation forms. It must be noted that several wells are often filed on each appropriation form, therefore, there are more wells than appropriations.

Well Use	Reported Use As Per App.* Forms	Reported Annual Withdrawals**	Total Number Reporting Annual Withdrawals	Total Number Not Reporting Annual Withdrawals	Percent of Total
1. Domestic	80	7,353,850	22	58	11.13
2. Stock	265	52,444,400	96	169	36.86
3. Irrigation	8	1,240,000	3	5	1.11
4. Industrial	20	12,020,000	7	13	2.78
5. Municipal	9	58,000,000	3	6	1.25
6. Domestic/Irrigation	6	19,287,500	5	1	.84
7. Domestic/Stock	201	161,506,084	159	42	27.96
8. Domestic/Stock/ Irrigation	40	62,714,900	28	12	5.56
9. Domestic/Stock/Garden	33	19,356,250	31	2	4.59
10. Domestic/Garden	34	17,634,100	29	5	4.73
11. Stock/Irrigation	16	4,194,160	12	4	2.20
12. Unknowns	7	1,125,000	3	4	.99
TOTALS	719	416,876,244	398	321	100%

*App.—Appropriation

**Withdrawals are shown in gallons

DAWSON COUNTY STRATIGRAPHIC SECTION

Rock Unit or Formation (Youngest to Oldest)	Geologic Age	Symbol	Approximate Thickness in Feet	Lithology	Water-Bearing Character
Alluvium	Quaternary	Qal	0 to 40+	Sand, gravel, silt and clay.	Yields of 5 to 150 gpm reported, with most yields in the range of 10 to 20 gpm.
Glacial lake deposits of Lake Glendive and Lake Circle	Quaternary	Qlg Qlc	Unreported	Fine sand, silt, and clay; patchy distribution or absent, resulting from prior existence of Glacial Lake Glendive (Qlg) and Glacial Lake Circle (Qlc).	Unreported.
Terrace deposits	Quaternary	Qt	0 to 120+	Sand, gravel, silt and clay.	Yields of 5 to 500 gpm reported, most in the range of 5 to 20 gpm; adequate for domestic needs, and small-scale irrigation.
Flaxville gravel	Tertiary	Tf	0 to 40+	Sand and gravel; patchy distribution where present.	Unreported.
Fort Union	Tertiary	Tfu	0 to 600±	Interbedded buff sandstone and shale, with coal seams.	Yields of 2 to 20 gpm reported, most in the range of 2 to 12 gpm; adequate for ranchers in some instances.
Hell Creek	Cretaceous	Khc	0 to 700±	Interbedded gray-brown sandstone and carbonaceous gray shale.	Yields adequate for ranchers in some instances. The upper part of the formation is considered to be in hydraulic connection with the overlying Fort Union, and the lower part hydraulically connected with the underlying Fox Hills sandstone.
Fox Hills	Cretaceous	Kfh	150 to 220	Gray to white massive to thin bedded sandstone, silty and shaly in part.	Yields of 2 to 200 gpm reported; usually adequate for ranchers, and locally adequate for municipal and small-scale industrial uses. Most-widely used aquifer for domestic purposes; water is under artesian pressure, and flowing yields are reported.
PIERRE SHALE: Bearpaw	Cretaceous	Kb	200 to 1,200	Dark colored shale.	Not normally an aquifer.
PIERRE SHALE: Judith River	Cretaceous	Kjr Kp	400 to 600	Interbedded tan sandstone, siltstone, and shale, becoming sandy shale eastward.	Sandstone intervals may yield small amounts of water locally. Produces natural gas on the Cedar Creek Anticline.
PIERRE SHALE: Claggett	Cretaceous	Kcl Kp	300 to 500	Tan-gray shale and sandy shale.	Not normally an aquifer.
PIERRE SHALE: Eagle	Cretaceous	Ke	200 to 300	Gray, white, "salt and pepper" sandstone and gray shale, becoming sandy shale eastward.	Sandstone intervals may yield small amounts of water locally. Produces natural gas on the Cedar Creek Anticline.
PIERRE SHALE: Telegraph Creek	Cretaceous	Ktc	50 to 100	Gray sandy shale.	Not normally an aquifer.
Colorado group	Cretaceous	Kc	2,000±	Dark-colored shales with thin sandstone stringers.	Not normally an aquifer, although sandstones within the interval may locally yield water.
Dakota	Cretaceous	Kd	70 to 100	Light-colored siltstone and sandstone.	Sandstone intervals may yield small to moderate amounts of water locally.
Fuson	Cretaceous	Kf	50 to 100	Dark and varicolored shales, locally with light-colored sandstone.	Sandstone may yield moderate amounts of water.
Lakota	Cretaceous	Kl	80 to 150	White sandstone, locally clay-filled.	Normally yields small to moderate and occasionally large, amounts of potable water.
Jurassic interval	Jurassic	Ju	900 to 1,000	Light-colored sandstone, tan limestone, gray and dark-colored shales.	Sandstone may locally yield small amounts of water.
Spearfish	Triassic	Ts	150 to 350	Red, brown, sandstones and shales.	Not considered an aquifer, although sandstones locally may yield water.
Permian interval	Permian	P	440±	Light-colored limestone and varicolored shale.	Not normally an aquifer in this area.
Pennsylvanian interval	Pennsylvanian	₱	150±	Varicolored shales, limestone stringers, and sandstone lenses.	Sandstone lenses may yield water.
Big Snowy group	Mississippian	Mbs	450 to 800	Dark and varicolored shales, light-colored limestone, and red sandstones and siltstones.	Limestones and sandstone may locally yield water.
Madison group	Mississippian	Mm	1,400 to 1,700	Light-colored massive and thin bedded limestone, dolomite and salt.	May yield copious amounts of water locally from solution cavities in massive limestone.
Devonian interval	Devonian	D	20 to 600	Tan, brown dolomites and limestones, with shale interbeds. Salt beds in places.	Several units within this interval yield small amounts of water.
Interlake	Silurian	Si	300 to 800	Cream-colored, white, tan, and brown dolomites.	May yield small to moderate amounts of water locally. Produces oil.
Ordovician interval	Ordovician	O	700±	Tan and brown dolomites, dark shales, and light-colored sandstones.	May yield water locally. Produces oil.
Cambrian interval	Cambrian	Є	1,000±	Sandstone, shale, dolomite, and limestone.	May yield water locally.
Precambrian	Precambrian	ρЄ		"Hard rock."	May yield small amounts of water through fractures.

SPRINGS

Springs in Dawson County are scattered around with little pattern. There is an increase in the number of springs along the Yellowstone valley and a conspicuous lack of them along the crest of the Cedar Creek Anticline.

Springs occur where the land surface intersects the water table. The springs in Dawson County are generally found in the coulees that cut deep into the Fort Union Formation. There is a less significant number arising from the other formations.

The Yellowstone River has cut deep into the Fort Union and older formations near the Cedar Creek Anticline. This explains the increase in springs near the river. The conspicuous lack of springs in the center of the anticline is due to the impermeable and nonporous shale which surfaces there.

The use of springs historically dates back to 1885. At that time, springs were predominantly used for stock watering just as they are today.

There are approximately 788 springs reported on 318 appropriation forms on file with the Montana Water Resources Board, as of January 1, 1971. The following table is a breakdown of each reported appropriation and its use. Again, it must be noted that often several springs are filed on each appropriation form.

Spring Use	Reported Use As Per App.* Forms	Reported Annual Withdrawals**	Total Number Reporting Annual Withdrawals	Total Number Not Reporting Annual Withdrawals	Percent of Total
1. Domestic	2	50,000	1	1	.63
2. Stock	133	6,006,500	11	122	41.82
3. Irrigation	14	0	0	14	4.40
4. Industrial	1	0	0	1	.31
5. Domestic/Stock	4	0	0	4	1.26
6. Stock/Irrigation	10	0	0	10	3.14
7. Stock/Garden	1	0	0	1	.31
8. Domestic/Stock/ Garden/Irrigation	2	0	0	2	.63
9. Unknown	151	7,126,780	17	134	47.50
TOTALS	318	13,183,280	29	289	100%

*App.—Appropriation
**Withdrawals are shown in gallons

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ECONOMIC MINERAL DEPOSITS

Economic mineral deposits—metallic, nonmetallic, mineral fuels, and ground water—are directly related to the geology of a given area. The geologic situation in Dawson County is therefore summarized before the resources are considered.

Dawson County is situated within the Northern Great Plains physiographic province, which may also be called the High Plains province. There are no mountains within the county, and the terrain is typically a fairly high plain dissected by stream valleys.

The underlying bedrock throughout most of the county is the Fort Union Formation (Tertiary), which is locally overlain by the Flaxville Gravel in much of the northern part of the county. The northwest-trending Cedar Creek Anticline extends into the southern part of the county in the vicinity of Glendive, where the Hell Creek Formation, Fox Hills Sandstone, and Pierre Shale outcrop; all these are Cretaceous units.

Petroleum Resources

Shell Oil Company completed the first commercial oil well in the Montana part of the Williston Basin in Dawson County in 1951. That well discovered the Richey field, now nearly depleted but important because it spurred extensive exploration of the Williston Basin area of Montana. Approximately 50 wells have been drilled in the search for oil in Dawson County, resulting in the discovery of six million barrels of oil. Recent activity has not been extensive. Three dry holes were completed during 1968. Large areas still remain virtually untested and seem to be of even greater interest in view of the recent discoveries of deep production in Richland County.

Coal

Dawson County lignite (coal) deposits contain an estimated 11,110 million short tons, of which 770 million short tons can readily be stripped. Previous production has come from the Pust, Carroll, and B beds of the Fort Union Formation. The Pust bed contains most of the coal and ranges from 10 to 43 feet in thickness. Major strippable coal fields in the county are the North Fork of Thirteen Mile Creek field (350 million short tons), Burns Creek field (200 million short tons), and Breezy Flat field (220 million short tons).

Sand and Gravel

Deposits of sand and gravel are widespread throughout the county in valley alluvium and the Flaxville Gravel. Most of the material would probably have to be washed to remove clay and soil before it could be used.

Metals

Dawson County has no known deposits of metals.

SOIL AND WATER CONSERVATION DISTRICT

Dawson County is served by the Dawson County Soil and Water Conservation District. The District, which was organized in 1945, includes all of Dawson County and is governed by a board of five supervisors who are elected by the land owners and occupiers of the District.

The supervisors carry out a program of complete resource conservation including erosion control, water conservation, soil management, land improvement, wildlife management, recreation, and land use adjustment. This program is accomplished by providing assistance to land owners and operators, on a voluntary basis, to plan and apply sound conservation treatment.

Under State law, the supervisors have the authority to call upon local, State and Federal agencies to assist in carrying out a soil and water program. The Soil Conservation Service, the Farmers Home Administration, the Agricultural Stabilization and Conservation Service, the Bureau of Land Management, the State Fish and Game Department, and the Dawson County Commissioners all provide assistance. The cooperation of these agencies and groups makes possible a complete and balanced soil and water conservation program in the District.

The Soil Conservation Service assists the District by furnishing and interpreting basic data on soils and plant cover and other features of land. Technical data are interpreted in terms of acceptable alternative uses and treatment to help guide the farm and ranch operator in developing sound conservation plans. It also aids district cooperators in performing operations requiring technical skills beyond the experience of the individuals involved. The technical assistance is available to any operator in the county upon request to the District. Cost-sharing assistance to help in the cost of applying conservation practices is available through the Great Plains Conservation Program or the Agricultural Stabilization Program administered by the Agricultural Stabilization and Conservation Service.

Dawson County comprises 1,509,120 acres of land. Of this amount, approximately 67,968 acres are Federal lands, approximately 85,230 acres are State lands and approximately 6,560 acres are Dawson County lands. The balance, 1,417,330 acres, is the privately owned, deeded portion. Private lands constitute 94 percent of the total land area of Dawson County.

Data from the 1966-67 Conservation Needs Inventory of Dawson County show grassland used for range, pasture, or hayland as the major land use with 1,063,610 acres or 71% of the total land area. The acreage of cropland is 406,848 acres, of which 19,642 acres are irrigated. Most of the irrigated lands are in the Buffalo Rapids and the Lower Yellowstone Projects. Irrigation water for both projects is provided from the Yellowstone River.

Other land uses include urban and built-up areas—20,515 acres; areas of ponds and lakes—1,678 acres; forest land—8,435 acres; and 8,034 acres of "other lands" which includes oilfield installations, gravel pits, irrigation canals and drains, towns and villages, etc.

The major crops grown in Dawson County are small grains and forage crops on dryland. Sugar

beets and beans are the major cash crops on the irrigated lands. The major livestock enterprise is beef cattle production, followed next by sheep production. There are a few scattered hog enterprises and a few dairy herds in the county.

The major grassland conservation practices in Dawson County are development of dams, springs and wells for livestock; grass seeding for hay and pasture and cross-fencing for better management of grazing. Conservation practices to protect cropland from wind and water erosion are stripcropping, stubble mulching, grass waterways, diversions and field shelterbelts. Major conservation practices applied on irrigated lands include land leveling, irrigation ditch and canal lining, water control structures and irrigation field ditches and drains.

FISH AND GAME

Dawson County falls within the sagebrush-grassland prairie of eastern Montana. This prairie country historically supported a great variety and abundance of game animals. The Yellowstone Valley was once considered the greatest hunting area in the west. Livestock and agriculture have mostly replaced the once great game herds, but the prairie continues to be the most productive wildlife habitat in Montana.

Antelope in large numbers may be found throughout the sagebrush range which they depend on for food and cover. Eight out of every ten hunters successfully hunt antelope in the fall. Mule deer range freely over the prairie, buttes and bottomlands alike, having the greatest abundance on well managed range. The whitetail deer is distributed along the stream and river bottoms where there is sufficient cover for his secretive habits. Deer hunters average 90 percent success each fall. Two-deer bag limits are allowed and many non-residents hunt the easily accessible terrain.

Game bird hunting is considered some of the finest in the northwest. Pheasants, Hungarian partridge, sharptail grouse, sage grouse and many species of waterfowl all vie for the hunters' attention.

Fishing is largely for warm-water species such as pike, sauger, walleye, bass and crappie. As water is not a plentiful commodity, most landowners have developed stock ponds. The Montana Fish and Game Department and the U. S. Bureau of Sport Fisheries and Wildlife have planted fish in many of these where the landowner will allow public fishing. In deeper and colder ponds, trout have been stocked to round out the fishing variety. Catfish abound in the Yellowstone River and the prehistoric paddlefish provides anglers with some of the most unique and exciting fishing in North America.

WATER RESOURCES SURVEY

Dawson County, Montana

PART II

Irrigation Development With Maps Showing Irrigated Areas In Colors Designating Sources of Supply

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IRRIGATION DEVELOPMENT

BUFFALO RAPIDS PROJECT

GLENDIVE UNIT

HISTORY

In an effort to combat depressed conditions in the area, local businessmen in 1933 formed the Mid-Yellowstone Recovery Association and obtained National Industrial Recovery Act funds for the Bureau of Reclamation to make an investigation. Based on the report of the investigation, the Glendive Unit was authorized to be constructed by the Bureau of Reclamation.

The Glendive Unit, First Division of the Buffalo Rapids Project was approved by the President on September 27, 1937, to irrigate an estimated 15,500 acres with funds provided under the Emergency Relief Appropriation Act of 1937. The Glendive extension was approved by the President on May 15, 1940, for 3,000 acres under the Water Conservation and Utilization Act of May 10, 1939 (53 Stat. 685). The Glendive Unit and extension constitute the First Division.

The construction of the Glendive Unit, First Division was initiated in 1937 by the Bureau of Reclamation. The main canal and portions of the laterals of this unit were completed in the spring of 1941. In 1942 and 1943, the Farm Security Administration completed the irrigation laterals and necessary concrete structures on the First Division. A third pumping unit at the Glendive Pumping Plant was installed by the Bureau of Reclamation in 1944 to increase the capacity of the pumping plant to furnish irrigation water for an additional 6,000 acres, or to be used as a standby in case one of the other two pump units needs repairs during the irrigation season. The Glendive Unit and its extension serves an area from Fallon to Glendive along the west bank of the Yellowstone River. No storage is provided as the water is pumped directly from the Yellowstone River to the main canal by electrically driven pumps.

PRESENT STATISTICS

Location: Lands irrigated under the Glendive Unit, in Dawson County, are in sections 4, 5 and 6, T. 13 N., R. 54 E.; sections 1, 2, 9, 10, 11, 12, 13, 14, 15, 16, 21 and 22, T. 13 N., R. 53 E.; sections 5, 6, 7, 8, 18 and 19, T. 14 N., R. 55 E.; sections 1, 11, 12, 13, 14, 15, 22, 23, 24, 27, 28, 31, 32 and 33, T. 14 N., R. 54 E.; sections 5, 6, 7, 8, 18 and 19, T. 14 N., R. 55 E.; sections 25 and 36, T. 15 N., R. 54 E.; sections 4, 5, 8, 9, 16, 17, 18, 19, 20, 21, 28, 29, 30, 31 and 32, T. 15 N., R. 55 E.; and sections 22, 26, 27, 28, 32, 33 and 34, T. 16 N., R. 55 E.

Location and Capacity of Pumping Plant: The Glendive Unit pumping plant is located in the SE¼NW¼ section 25, T. 13 N., R. 52 E. and has three (3) pumps with capacities of 110 c.f.s. each.

Length and Capacity of Canal: The Glendive Canal from the pumping plant has an initial capacity of 330 c.f.s. and a total length of 35 miles. This canal originates at the pumping plant in Prairie County, with 6.25 miles in Prairie County and 28.75 miles in Dawson County.

Operation and Maintenance: Charges under the Glendive Unit are the same as all other units of the Buffalo Rapids Project. This charge is $4.35 for each acre of land irrigated.

Present Users: In Dawson the number of water users in Division No. 1 totaled 41. This does not include the water sold to individuals and small tracts in the Forest Park and Highland Park subdivisions.

Acreage Irrigated: In 1969 there were 12,692.66 acres irrigated under the Clendive Unit in Dawson County, with 933.25 acres potentially irrigable under existing ditch facilities, making a maximum irrigable acreage of 13,625.91 acres under the system.

WATER RIGHT DATA

The water right filing appurtenant to the Buffalo Rapids Project, Glendive Unit was filed by Paul A. Jones, Construction Engineer for the project, acting in behalf of the United States. The filing was made on August 27, 1940, with the priority date given as June 17, 1938, for 1,340 cubic feet per second of the waters of the Yellowstone River and its tributaries. This filing is recorded in Book D-4, page 401, Clerk and Recorder's Office, Dawson County, Clendive, Montana.

(See maps in Part II: Pages 1, 2, 7, 9, 10 and 16.)

INTAKE CANAL

HISTORY

The early settlers of this area of eastern Montana depended on stock raising for their livelihood. During years of sufficient rainfall abundant crops were produced, but these years were so infrequent that the need for irrigation soon became apparent.

When the Lower Yellowstone Project was completed in 1909, about 260 acres of land now under the Intake Project was irrigated by privately operated pumps which lifted the water from the Lower Yellowstone Main Canal to the land.

The Bureau of Reclamation made an investigation of the general area of the Intake Project and submitted its findings in a report dated April, 1942. The project was authorized on the basis of this report.

The project was authorized by the President of the United States on January 20, 1944, under terms of the Water Conservation and Utilization Act of August 11, 1939 (53 Stat. 1418), as amended. The project was also included in the Yellowstone River Pumping Unit authorized as a part of the Missouri River Basin Project's initial development in the Flood Control Act of 1944, Public Law 534, 78th Congress. However, construction proceeded under the original authorization so that the Intake Project is not a part of the Missouri River Basin Project.

Construction began in July 1945 and was completed in time for the delivery of water during the 1946 irrigation season.

The project includes a pumping plant and an irrigation distribution system serving about 880 acres of land in Dawson County, Montana, adjacent to the Lower Yellowstone Project. The pumping plant is located on the Main Canal of the Lower Yellowstone Project, about 1½ miles downstream from Intake, Montana.

The project provides for a full water supply for about 620 acres of new land, and replaces individual pumping plants formerly pumping water for 260 acres of irrigated land. Water is pumped from the Main Canal of the Lower Yellowstone Projeet.

The electrical requirements of the pumping station are supplied from the Fort Peek Project by wheeling over facilities of the Montana-Dakota Utilities Company.

The Board of Control of the Lower Yellowstone Project operates and maintains the Intake Project.

PRESENT STATISTICS

Location: Lands irrigated under the Intake Project are located in sections 16, 17, 18, 19 and 20, T. 18 N., R. 57 E. The pumping plant is located on the Main Canal of the Lower Yellowstone Project in SE¼NW¼ section 19, T. 18 N., R. 57 E.

Length and Capacities of Canals: The pumping plant contains two eleetric motors and two pumps. One pump lifts 3 c.f.s. of water 10 feet and discharges into Lateral A-2, which is 1 mile long. The other pump lifts 15 c.f.s. of water 16 feet into Lateral A-3, which is 2.9 miles long.

Operation and Maintenance: The operation and maintenance eharge for each acre of land irrigated under the Intake Project is $5.50 and includes construetion.

Present Users: There were three (3) water nsers under the Intake Project in 1969.

Acreage Irrigated: In 1969, there were 706 acres irrigated under present facilities fer the Intake Project with 6 additional irrigable acres under the pumping system.

WATER RIGHT DATA

The water right that is appurtenant to the Intake Project was filed by the United States of America (Bureau of Reclamation) from the Yellowstone River, dated November 11, 1944 for 18 e.f.s. (Referenee: Book D-4 of Water Rights, page 408, Clerk and Recorder's office, Dawson County, Glendive, Montana.

(See map in Part II, page 27.)

LOWER YELLOWSTONE PROJECT

HISTORY

Following the completion of the Northern Pacific Railway in 1883, cattlemen had settled in the project area. There was limited irrigation of meadow-land hy a few of the settlers prior to the construction of the irrigation project.

The first investigations were made by the engineers of the Reclamation Service in July 1903. A report by a board of consnlting engineers dated April 23, 1904, served as a basis for the authorization of the project.

The project was authorized by the Secretary of the Interior on May 10, 1904, under the Reclamation Act of June 17, 1902.

The Lower Yellowstone Project is located in east-central Montana and western North Dakota and includes the Lower Yellowstone Diversion Dam, the Main Canal, the Thomas Point Pumping Plant, 225 miles of laterals, and 110 miles of drains. The purpose of the project is to furnish a dependable supply of irrigation water for about 56,000 acres of fertile land along the west bank of the Yellowstone River. About one-third of the project lands are in North Dakota and two-thirds in Montana.

Water is diverted from the Yellowstone River into the Main Canal by the Lower Yellowstone Diversion Dam near Intake, Montana. Water is carried by gravity to the greater portion of the project lands. About 2,300 acres of benchland is irrigated by water pumped from the canal by the Thomas Point Pumping Plant. The Lower Yellowstone Diversion Dam is located on the Yellowstone River about 18 miles below Glendive, Montana, and is a rock-filled timber crib weir about 12 feet high. The dam contains 22,500 cubic yards of material. Construction of the project began on July 22, 1905, and water was available for irrigation during the season of 1909.

This project is operated by the Board of Control of the Lower Yellowstone Project.

PRESENT STATISTICS

Location: The land irrigated by the Lower Yellowstone Project in Dawson County is located in sections 25 and 36, T. 18 N., R. 56 E.; and in sections 3, 4, 9, 10 and 30, T. 18 N., R. 57 E.

Length and Capacity of Canal: From the Lower Yellowstone Diversion Dam near Intake, the Main Canal follows a generally northeasterly direction along the west side of the Yellowstone River for a distance of about 6¾ miles to the Richland County Line. The total length of the Main Canal is 71.6 miles and it has an initial capacity of 1,200 c.f.s.

Operation and Maintenance: The charges for operation and maintenance of the Lower Yellowstone Project are $4.50 an acre.

Present Users: During the year of 1969 there were six (6) water users under the Lower Yellowstone Project in Dawson County and seven (7) users obtaining water on a "water rental" basis for small acreages.

Acreage Irrigated: In 1969, there were 962 acres irrigated and 5 acres potentially irrigable under present ditch facilities for the Lower Yellowstone Project in Dawson County.

WATER RIGHT DATA

The water rights that apply to the Lower Yellowstone Project are as follows:

1. An appropriation by the United States of America from the Yellowstone River, dated October 30, 1905, for 1,000 c.f.s. (Reference: Book "B" of Water Right Locations, page 357, Clerk and Recorder's office, Dawson County, Glendive, Montana.)

2. An appropriation by the Lower Yellowstone Irrigation District #I from the Yellowstone River, dated June 27, 1939, for 1,300 c.f.s. (Reference: Book IV, Water Right Locations, page 394, Clerk and Recorder's office, Dawson County, Glendive, Montana).

(See map in Part II, page 27.)

WATER RIGHT DATA AND IRRIGATION SUMMARY BY STREAMS

(Filings of Record)

		APPROPRIATIONS			DECREED RIGHTS				IRRIGATION SUMMARY		
**Locator	STREAM	No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigated and Irrigable Acres Under Present Facilities
	MISSOURI RIVER BASIN										
	Missouri River										
	*Redwater River	6	31,788.00	794.70	......	..	......	......	68.00	32.00	100.00
20N-50E	Sioux (Cottonwood) Creek	1	2,000.00	50.00	......	..	......	......	72.00	0.00	72.00
20N-50E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	8.00	0.00	8.00
18N-50E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	0.00	2.00	2.00
18N-50E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	8.00	0.00	8.00
19N-50E	Berry Creek	1	200.00	5.00	......	..	......	......	0.00	0.00	0.00
18N-50E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	0.00	7.00	7.00
18N-50E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	0.00	13.00	13.00
20N-50E	Corral Creek	1	500.00	12.50	......	..	......	......	142.00	0.00	142.00
20N-50E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	8.00	0.00	8.00
20N-50E	Unnamed Trib.	1	2,000.00	50.00	......	..	......	......	0.00	0.00	0.00
20N-50E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	26.00	0.00	26.00
20N-50E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	8.00	0.00	8.00
21N-50E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	16.00	0.00	16.00
21N-50E	Bluff Creek	1	1,200.00	30.00	......	..	......	......	14.00	0.00	14.00
20N-50E	Brush Coulee	1	2,000.00	50.00	......	..	......	......	0.00	0.00	0.00
21N-50E	Duck Creek	0	0.00	0.00	......	..	......	......	81.00	0.00	81.00
22N-50E	Cow Creek	1	500.00	12.50	......	..	......	......	0.00	0.00	0.00
22N-50E	Sullivan Creek	2	500.00	12.50	......	..	......	......	0.00	0.00	0.00
21N-51E	Unnamed Trib.	2	......	......	......	..	......	......	0.00	0.00	0.00
21N-51E	Olson Creek	1	......	......	......	..	......	......	0.00	0.00	0.00
21N-50E	Unnamed Trib.	1	......	......	......	..	......	......	0.00	0.00	0.00
20N-51E	Unnamed Trib.	1	......	......	......	..	......	......	0.00	0.00	0.00
22N-50E	Hay Creek	1	......	......	......	..	......	......	104.00	0.00	104.00
23N-50E	Unnamed Coulee	1	100.00	2.50	......	..	......	......	4.00	0.00	4.00
23N-50E	Unnamed Coulee	1	100.00	2.50	......	..	......	......	5.00	0.00	5.00
23N-50E	Unnamed Coulee	1	2,000.00	50.00	......	..	......	......	53.00	0.00	53.00
23N-50E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	10.00	0.00	10.00
23N-50E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	10.00	0.00	10.00
23N-50E	Pasture Creek	0	0.00	0.00	......	..	......	......	12.00	0.00	12.00
22N-51E	Unnamed Coulee	1	......	......	......	..	......	......	0.00	0.00	0.00
21N-51E	West Fork Pasture Creek	0	0.00	0.00	......	..	......	......	10.00	0.00	10.00
22N-51E	East Fork Pasture Creek	2	490.00	12.25	......	..	......	......	29.00	0.00	29.00
23N-50E	Ash Coulee	1	500.00	12.50	......	..	......	......	0.00	25.00	25.00
23N-50E	Gold Gulch (Creek)	2	200.00	5.00	......	..	......	......	35.00	0.00	35.00
23N-50E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	18.00	0.00	18.00
23N-50E	Little Creek	1	240.00	6.00	......	..	......	......	0.00	0.00	0.00
23N-50E	Unnamed Coulee	1	......	......	......	..	......	......	0.00	0.00	0.00
23N-50E	Unnamed Coulee	1	5,220.00	130.50	......	..	......	......	0.00	0.00	0.00
22N-52E	Lisk (List) Creek	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
22N-52E	South Fork Lisk (List) Creek	5	7,700.00	192.50	......	..	......	......	179.00	0.00	179.00
	East Redwater Creek	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
22N-52E	Unnamed Coulee	1	2,000.00	50.00	......	..	......	......	16.00	12.00	28.00
22N-52E	Unnamed Coulee	1	2,000.00	50.00	......	..	......	......	16.00	12.00	28.00
	Total of Redwater River And Tributaries	40	61,238.00	1,530.95	......	..	......	......	952.00	103.00	1,055.00
18N-57E	Yellowstone River	27	457,145.00	11,428.63	......	..	......	......	16,274.36	1,029.60	17,303.96
13N-53E	Bad Route (Cracker Box) (Seven Mile) Creek	5	348.00	8.70	......	..	......	......	0.00	0.00	0.00
15N-51E	East Fork Bad Route Creek	1	116.00	2.90	......	..	......	......	281.00	0.00	281.00
15N-51E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	30.00	0.00	30.00
15N-51E	Middle Fork Bad Route Creek	3	3,012.00	75.30	......	..	......	......	239.00	0.00	239.00
15N-51E	Unnamed Trib.	1	12.00	.30	......	..	......	......	0.00	0.00	0.00
15N-51E	Unnamed Trib.	1	12.00	.30	......	..	......	......	0.00	0.00	0.00
14N-52E	Unnamed Trib.	1	......	......	......	..	......	......	11.00	0.00	11.00
14N-52E	Unnamed Trib.	1	200.00	5.00	......	..	......	......	9.00	0.00	9.00
14N-52E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	34.00	0.00	34.00
14N-52E	Unnamed Coulee	1	......	......	......	..	......	......	0.00	0.00	0.00
14N-51E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	32.00	0.00	32.00
14N-51E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	14.00	0.00	14.00
13N-53E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
13N-54E	Spring	2	502.31	12.56	......	..	......	......	0.00	0.00	0.00
13N-53E	Dry Creek	1	4.50	.11	......	..	......	......	0.00	0.00	0.00
13N-53E	Coyote Coulee	1	7.00	.17	......	..	......	......	0.00	0.00	0.00
13N-53E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
13N-54E	Marsh Springs	1	500.00	12.50	......	..	......	......	0.00	0.00	0.00
13N-54E	(South Fork) Cracker Box Creek	6	4,872.00	121.80	......	..	......	......	0.00	0.00	0.00
14N-53E	North Fork Cracker Box Creek	1	100.00	2.50	......	..	......	......	0.00	0.00	0.00
14N-53E	A Dry Coulee	1	......	......	......	..	......	......	0.00	0.00	0.00
13N-54E	Conrad Coulee	1	100.00	2.50	......	..	......	......	0.00	0.00	0.00
13N-54E	Unnamed Trib.	1	9.00	.22	......	..	......	......	0.00	0.00	0.00
13N-54E	Big Tree Springs	1	7.00	.17	......	..	......	......	0.00	0.00	0.00
14N-54E	Dry Coulee	1	200.00	5.00	......	..	......	......	0.00	0.00	0.00
14N-54E	Cabin Creek	1	1,224.00	30.60	......	..	......	......	252.00	175.00	427.00
13N-54E	U. E. (Ewey) Creek	1	2,000.00	50.00	......	..	......	......	25.00	0.00	25.00
13N-55E	South Fork U. E. Creek	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
13N-55E	4-E Creek	1	......	......	......	..	......	......	0.00	0.00	0.00
14N-54E	Monroe Creek	2	3.00	.07	......	..	......	......	0.00	0.00	0.00
14N-55E	Clear Creek	19	10,386,820.00	259,670.50	......	..	......	......	333.64	3.00	336.64
17N-50E	Unnamed Trib. (Clear Creek)	1	1,000.00	25.00	......	..	......	......	0.00	0.00	0.00
17N-50E	Unnamed Trib. (A Dry Wash)	1	......	......	......	..	......	......	0.00	0.00	0.00
16N-51E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
16N-51E	Unnamed Coulee	1	400.00	10.00	......	..	......	......	0.00	0.00	0.00
16N-51E	Unnamed Creek	1	25.00	.62	......	..	......	......	0.00	0.00	0.00
16N-51E	Unnamed Creek	1	25.00	.62	......	..	......	......	0.00	0.00	0.00
16N-51E	Unnamed Trib. (Clear Creek)	1	18A/F	18A/F	......	..	......	......	41.00	0.00	41.00
16N-51E	West (South) Prong Clear Creek	2	800.00	20.00	......	..	......	......	0.00	0.00	0.00
16N-52E	Cigar Creek	1	2,000.00	50.00	......	..	......	......	0.00	0.00	0.00
16N-52E	Unnamed Trib.	1	240.00	6.00	......	..	......	......	0.00	0.00	0.00
16N-52E	Unnamed Creek	1	2,000.00	50.00	......	..	......	......	0.00	0.00	0.00
16N-52E	Unnamed Creek	1	48.50	1.21	......	..	......	......	0.00	0.00	0.00
16N-52E	(North Branch of) Clear Creek	1	320.00	8.00	......	..	......	......	0.00	0.00	0.00
15N-53E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	6.00	0.00	6.00
15N-53E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	4.00	2.00	6.00
14N-55E	Cedar Creek	1	60.00	1.50	......	..	......	......	0.00	0.00	0.00
13N-56E	Unnamed Stream	1	4,452.00	111.30	......	..	......	......	0.00	0.00	0.00
13N-56E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	9.00	0.00	9.00
13N-56E	Lobella Draw	2	92,531.00	2,313.27	......	..	......	......	0.00	0.00	0.00
13N-56E	Lost Coulee	1	6,466.00	161.65	......	..	......	......	15.00	0.00	15.00
13N-56E	Unnamed Stream	2	41,264.00	1,031.60	......	..	......	......	0.00	0.00	0.00
13N-56E	Unnamed Trib.	1	19,080.00	477.00	......	..	......	......	0.00	0.00	0.00
13N-56E	Sage Brush Draw	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
13N-56E	Unnamed Trib.	1	30,140.00	753.50	......	..	......	......	0.00	0.00	0.00
13N-55E	Abbott Draw	1	35,955.00	898.88	......	..	......	......	0.00	0.00	0.00
13N-56E	Unnamed Stream	1	5,724.00	143.10	......	..	......	......	0.00	0.00	0.00
13N-55E	Unnamed Stream	1	17,490.00	437.25	......	..	......	......	0.00	0.00	0.00
13N-55E	Unnamed Stream	3	29,172.00	729.30	......	..	......	......	0.00	0.00	0.00
13N-55E	Unnamed Stream	1	37,011.00	925.28	......	..	......	......	32.00	0.00	32.00
13N-55E	Unnamed Stream	1	11,376.00	284.40	......	..	......	......	0.00	0.00	0.00
14N-55E	Unnamed Stream	1	34,823.00	870.58	......	..	......	......	20.00	0.00	20.00
13N-55E	Unnamed Stream	1	6,572.00	164.30	......	..	......	......	0.00	0.00	0.00
13N-55E	Unnamed Stream	1	5,242.00	131.05	......	..	......	......	0.00	0.00	0.00
13N-55E	Unnamed Trib.	1	18A/F	18A/F	......	..	......	......	0.00	0.00	0.00
14N-55E	Mag Pie Creek	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
14N-56E	Unnamed Stream	1	27,306.00	682.65	......	..	......	......	0.00	0.00	0.00
14N-55E	Unnamed Stream	1	3,205.00	80.13	......	..	......	......	0.00	0.00	0.00
14N-55E	Unnamed Stream	1	2,511.00	62.77	......	..	......	......	0.00	0.00	0.00
14N-55E	Unnamed Stream	1	3,142.00	78.56	......	..	......	......	0.00	0.00	0.00
14N-55E	Smoky Coulee	1	60.00	1.50	......	..	......	......	0.00	0.00	0.00
14N-55E	Unnamed Coulee	1	1.20	.03	......	..	......	......	0.00	0.00	0.00
14N-55E	A Ravine	1	300.00	7.50	......	..	......	......	0.00	0.00	0.00
15N-55E	Whoop-up (Timber) Creek	2	4,000.00	100.00	......	..	......	......	0.00	15.00	15.00
15N-54E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	3.00	0.00	3.00
15N-55E	A Slough	1	200.00	5.00	......	..	......	......	0.00	0.00	0.00
15N-55E	Cunningham Creek	2	700.00	17.50	......	..	......	......	0.00	0.00	0.00
15N-55E	Guelff Spring	0	0.00	0.00	......	..	......	......	86.00	0.00	85.00
15N-54E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	4.00	0.00	4.00
15N-55E	Sand Creek	3	2,500.00	62.50	......	..	......	......	59.00	0.00	59.00
15N-53E	Unnamed Coulee	1	100.00	2.50	......	..	......	......	0.00	0.00	0.00
15N-53E	Unnamed Coulee	2	740.00	18.50	......	..	......	......	12.00	0.00	12.00
15N-53E	Unnamed Coulee	1	100.00	2.50	......	..	......	......	0.00	0.00	0.00
15N-54E	Unnamed Trib.	1	200.00	5.00	......	..	......	......	0.00	0.00	0.00
15N-54E	Dry Creek	0	0.00	0.00	......	..	......	......	20.00	10.00	30.00
15N-53E	Unnamed Coulee	1	2,800.00	70.00	......	..	......	......	0.00	0.00	0.00
15N-54E	Springs	2	400.00	10.00	......	..	......	......	0.00	0.00	0.00
15N-54E	North Fork Sand Creek	1	520.00	13.00	......	..	......	......	0.00	0.00	0.00
15N-55E	Sand Creek	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
15N-55E	Forbill Creek	1	1,000.00	25.00	......	..	......	......	42.00	0.00	42.00
15N-55E	Fish Creek	3	2,200.00	55.00	......	..	......	......	0.00	0.00	0.00
15N-55E	Sand Creek	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
15N-55E	Springs	1	200.00	5.00	......	..	......	......	0.00	0.00	0.00
15N-55E	Antelope Creek	2	400.00	10.00	......	..	......	......	0.00	0.00	0.00
15N-55E	Unnamed Trib.	1	1,000.00	25.00	......	..	......	......	0.00	0.00	0.00
15N-55E	(Upper) Seven Mile (Spring) Creek	16	6,215.00	155.37	......	..	......	......	143.00	0.00	143.00
17N-51E	Hay Creek	1	500.00	12.50	......	..	......	......	0.00	0.00	0.00
17N-52E	Spring Creek	1	500.00	12.50	......	..	......	......	0.00	0.00	0.00
16N-53E	Timber Fork Seven Mile Creek	1	600.00	15.00	......	..	......	......	0.00	20.00	20.00
17N-51E	Unnamed Creek	1	......	......	......	..	......	......	0.00	0.00	0.00
16N-52E	Unnamed Coulee	2	......	......	......	..	......	......	0.00	0.00	0.00
16N-52E	Unnamed Coulee	1	......	......	......	..	......	......	0.00	0.00	0.00
16N-52E	Wolf Creek	1	......	......	......	..	......	......	0.00	0.00	0.00
16N-53E	Unnamed Creek	0	0.00	0.00	......	..	......	......	0.00	8.00	8.00
16N-53E	Unnamed Coulee	1	800.00	20.00	......	..	......	......	0.00	0.00	0.00
16N-53E	Branch of Spring Creek	0	0.00	0.00	......	..	......	......	0.00	115.00	115.00
16N-54E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
16N-54E	Gleason Spring	2	1,050.00	26.25	......	..	......	......	0.00	0.00	0.00
16N-54E	Hurst's Coulee	1	200.00	5.00	......	..	......	......	0.00	0.00	0.00
15N-55E	Gravel Pit	0	0.00	0.00	......	..	......	......	33.00	0.00	33.00
16N-55E	Dry Creek	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
16N-54E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	10.00	0.00	10.00
16N-55E	Garden Coulee Springs	1	200.00	5.00	......	..	......	......	0.00	0.00	0.00
16N-55E	Spring	1	13.36	.33	......	..	......	......	0.00	0.00	0.00
16N-55E	Well	1	41.00	1.02	......	..	......	......	0.00	0.00	0.00
16N-55E	Well	1	27.00	.68	......	..	......	......	0.00	0.00	0.00
16N-55E	Run-off of Buffalo Rapids Project	0	0.00	0.00	......	..	......	......	0.00	3.00	3.00
16N-55E	Crisafulli Creek	1	400.00	10.00	......	..	......	......	0.00	0.00	0.00
16N-55E	Unnamed Creek	0	0.00	0.00	......	..	......	......	15.00	0.00	15.00
16N-56E	Glendive Creek	2	143.00	3.57	......	..	......	......	0.00	0.00	0.00
16N-56E	Krug Creek	1	1,000.00	25.00	......	..	......	......	0.00	0.00	0.00
16N-56E	Griffith Creek	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
16N-57E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	10.00	0.00	10.00
16N-56E	Deer (Clear) Creek	13	5,447.00	136.17	......	..	......	......	414.00	10.00	424.00
17N-53E	South Fork Deer Creek	3	3,356.00	83.90	......	..	......	......	130.00	0.00	130.00
18N-52E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	0.00	20.00	20.00
17N-53E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	11.00	0.00	11.00
17N-53E	North Fork Deer Creek	5	2,680.00	67.00	......	..	......	......	66.00	0.00	66.00
18N-53E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	2.00	0.00	2.00
17N-53E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	30.00	0.00	30.00
17N-53E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	2.00	0.00	2.00
19N-52E	Upper Deer Creek	1	All	All	......	..	......	......	0.00	0.00	0.00
17N-53E	Kelly Coulee	1	1,000.00	25.00	......	..	......	......	0.00	0.00	0.00
17N-54E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	30.00	0.00	30.00
17N-54E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	2.00	0.00	2.00
17N-54E	Unnamed Coulee	2	All	All	......	..	......	......	42.00	7.00	49.00
17N-54E	Unnamed Coulee	1	All	All	......	..	......	......	34.00	0.00	34.00
17N-54E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	4.00	0.00	4.00
17N-54E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	3.00	0.00	3.00
17N-54E	Unnamed Coulee	1	400.00	10.00	......	..	......	......	0.00	0.00	0.00
17N-54E	Unnamed Coulee	1	800.00	20.00	......	..	......	......	0.00	0.00	0.00
17N-54E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	25.00	0.00	25.00
16N-54E	Reservoir	1	800.00	20.00	......	..	......	......	0.00	0.00	0.00
17N-54E	Unnamed Coulee	1	800.00	20.00	......	..	......	......	27.00	0.00	27.00
16N-55E	A Dry Coulee	1	1,000.00	25.00	......	..	......	......	0.00	0.00	0.00
16N-56E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
16N-56E	2 (Two) Wells	1	All	All	......	..	......	......	0.00	0.00	0.00
17N-55E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	26.00	0.00	26.00
17N-55E	Three Mile Creek	1	100.00	2.50	......	..	......	......	0.00	0.00	0.00
17N-56E	A Dry Coulee	1	100.00	2.50	......	..	......	......	0.00	0.00	0.00
17N-56E	Unnamed Tribs.	3	All	All	......	..	......	......	0.00	0.00	0.00
17N-56E	Springs	0	0.00	0.00	......	..	......	......	74.00	0.00	74.00
17N-56E	Unnamed Trib.	1	All	All	......	..	......	......	136.00	0.00	136.00
17N-55E	A Dry Coulee	2	200.00	5.00	......	..	......	......	0.00	0.00	0.00
17N-56E	School House Coulee	1	300.00	7.50	......	..	......	......	15.00	0.00	15.00
17N-56E	Lower Seven Mile Creek	9	1,670.00	41.75	......	..	......	......	0.00	0.00	0.00
18N-54E	Spring Coulee	0	0.00	0.00	......	..	......	......	10.00	5.00	15.00
18N-54E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	7.00	8.00	15.00
18N-54E	Unnamed Coulee	1	120.00	3.00	......	..	......	......	0.00	0.00	0.00
18N-54E	Spring Coulee	1	160.00	4.00	......	..	......	......	0.00	0.00	0.00
18N-54E	Spring	1	60.00	1.50	......	..	......	......	0.00	0.00	0.00
17N-56E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	7.00	0.00	7.00
17N-56E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
17N-56E	Dry Creek Springs	1	500.00	12.50	......	..	......	......	0.00	0.00	0.00
17N-56E	Wards Coulee	1	400.00	10.00	......	..	......	......	0.00	0.00	0.00
17N-56E	Morgan Creek	3	486.00	12.15	......	..	......	......	0.00	0.00	0.00
18N-55E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	0.00	3.00	3.00
17N-56E	Coal Coulee	1	300.00	7.50	......	..	......	......	0.00	0.00	0.00
18N-56E	Thirteen Mile Creek	3	1,700.00	42.50	......	..	......	......	0.00	18.00	18.00
20N-54E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	60.00	0.00	60.00
19N-54E	Middle Fork Thirteen Mile Creek	2	400.00	10.00	......	..	......	......	0.00	0.00	0.00
19N-54E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	7.00	0.00	7.00
19N-54E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	12.00	0.00	12.00
19N-55E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	0.00	5.00	5.00
19N-53E	South Fork Thirteen Mile	1	300.00	7.50	......	..	......	......	0.00	0.00	0.00
19N-53E	Bull Range Coulee	1	80.00	2.00	......	..	......	......	0.00	0.00	0.00
19N-54E	Center Fork Thirteen Mile	1	40.00	1.00	......	..	......	......	0.00	0.00	0.00
20N-53E	Unnamed Trib.	1	160.00	4.00	......	..	......	......	0.00	0.00	0.00
19N-54E	Spring	1	600.00	15.00	......	..	......	......	0.00	0.00	0.00
19N-55E	Spring Creek	1	132.00	3.30	......	..	......	......	0.00	0.00	0.00
18N-55E	Unnamed Stream	1	560.00	14.00	......	..	......	......	0.00	7.00	7.00
18N-55E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	0.00	21.00	21.00
19N-56E	Unnamed Creek	1	89.00	2.22	......	..	......	......	0.00	5.00	5.00
18N-56E	Unnamed Stream	1	300.00	7.50	......	..	......	......	0.00	0.00	0.00
17N-56E	Elm Coulee	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
17N-56E	Springs	1	40.00	1.00	......	..	......	......	0.00	0.00	0.00
18N-57E	Box Elder (Serrine) Creek	3	2,000.00	50.00	......	..	......	......	114.00	0.00	114.00
16N-58E	Unnamed Coulee	1	301A/F	301A/F	......	..	......	......	40.00	0.00	40.00
16N-58E	Unnamed Coulee	1	35A/F	35A/F	......	..	......	......	0.00	0.00	0.00
16N-58E	Unnamed Coulee	1	35A/F	35A/F	......	..	......	......	0.00	0.00	0.00
16N-58E	Unnamed Coulee	2	145A/F	145A/F	......	..	......	......	24.00	0.00	24.00
17N-57E	Unnamed Coulee	1	35A/F	35A/F	......	..	......	......	0.00	0.00	0.00
17N-57E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	11.00	0.00	11.00
17N-57E	Unnamed Coulee	0	0.00	0.00	......	..	......	......	11.00	8.00	19.00
17N-57E	Serrine Creek	1	300.00	7.50	......	..	......	......	0.00	0.00	0.00
17N-56E	Shryve Creek	1	300.00	7.50	......	..	......	......	0.00	0.00	0.00
17N-57E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
17N-57E	Stockade Coulee Spring	1	5.00	.13	......	..	......	......	0.00	0.00	0.00
17N-57E	Unnamed Coulee	1	35.00	.88	......	..	......	......	0.00	0.00	0.00
18N-57E	Blacktail Coulee	2	200.00	5.00	......	..	......	......	0.00	0.00	0.00
18N-57E	Unnamed Trib.	1	300.00	7.50	......	..	......	......	0.00	0.00	0.00
19N-56E	Burns Creek	1	1,000.00	25.00	......	..	......	......	0.00	0.00	0.00
19N-56E	North Fork Burns Creek	1	300.00	7.50	......	..	......	......	0.00	0.00	0.00
19N-56E	South Fork Burns Creek	7	2,449.00	61.22	......	..	......	......	9.00	6.00	15.00
20N-54E	Unnamed Trib.	1	116.20	2.90	......	..	......	......	0.00	0.00	0.00
20N-56E	Certain Spring	1	60.00	1.50	......	..	......	......	0.00	0.00	0.00
19N-56E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
19N-56E	Unnamed Trib.	1	89.00	2.22	......	..	......	......	0.00	0.00	0.00
19N-56E	Unnamed Trib.	0	0.00	0.00	......	..	......	......	0.00	0.00	0.00
19N-56E	Springs	1	2.5A/F	2.5A/F	......	..	......	......	0.00	0.00	0.00
	Total Of Yellowstone River And Tributaries	287	11,338,919.07	283,472.94	......	..	......	......	19,484.00	1,503.60	20,987.60
	GRAND TOTAL OF DAWSON COUNTY	327	11,400,157.07	285,003.89	......	..	......	......	20,436.00	1,606.60	22,042.60

* Names of streams indented on the left hand margin indicate that they are tributaries of the first stream named above which is not indented.
**The township & range shown in the locator column indicates either where a stream enters the next larger drainage or where a stream or drainage leaves the county.

DRAINAGES IN DAWSON COUNTY NOT LOCATED

Unnamed Coulee	1	2,000.00	50.00
Unnamed Coulee	1	2,000.00	50.00
A Coulee	1	340.00	8.50
Little Haystack Springs	1	100.00	2.50
Upper Spring on Sand Creek	1	600.00	15.00
Unnamed Trib.	1	160.00	4.00
North Fork Cherry Coulee	1	400.00	10.00
Benoit Creek	1	480.00	12.00
Coal Creek	1	120.00	3.00
Cottonwood Coulee	2	394.00	9.85
TOTAL	11	6,594.00	164.85

SUMMARY OF IRRIGATED LAND BY RIVER BASINS IN THE FOLLOWING COUNTIES COMPLETED TO DATE

Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Dawson, Deer Lodge, Fallon, Flathead, Gallatin, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis & Clark, Liberty, Lincoln, Madison, Meagher, Mineral, Missoula, Musselshell, Park, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Rosebud, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wibaux and Yellowstone.

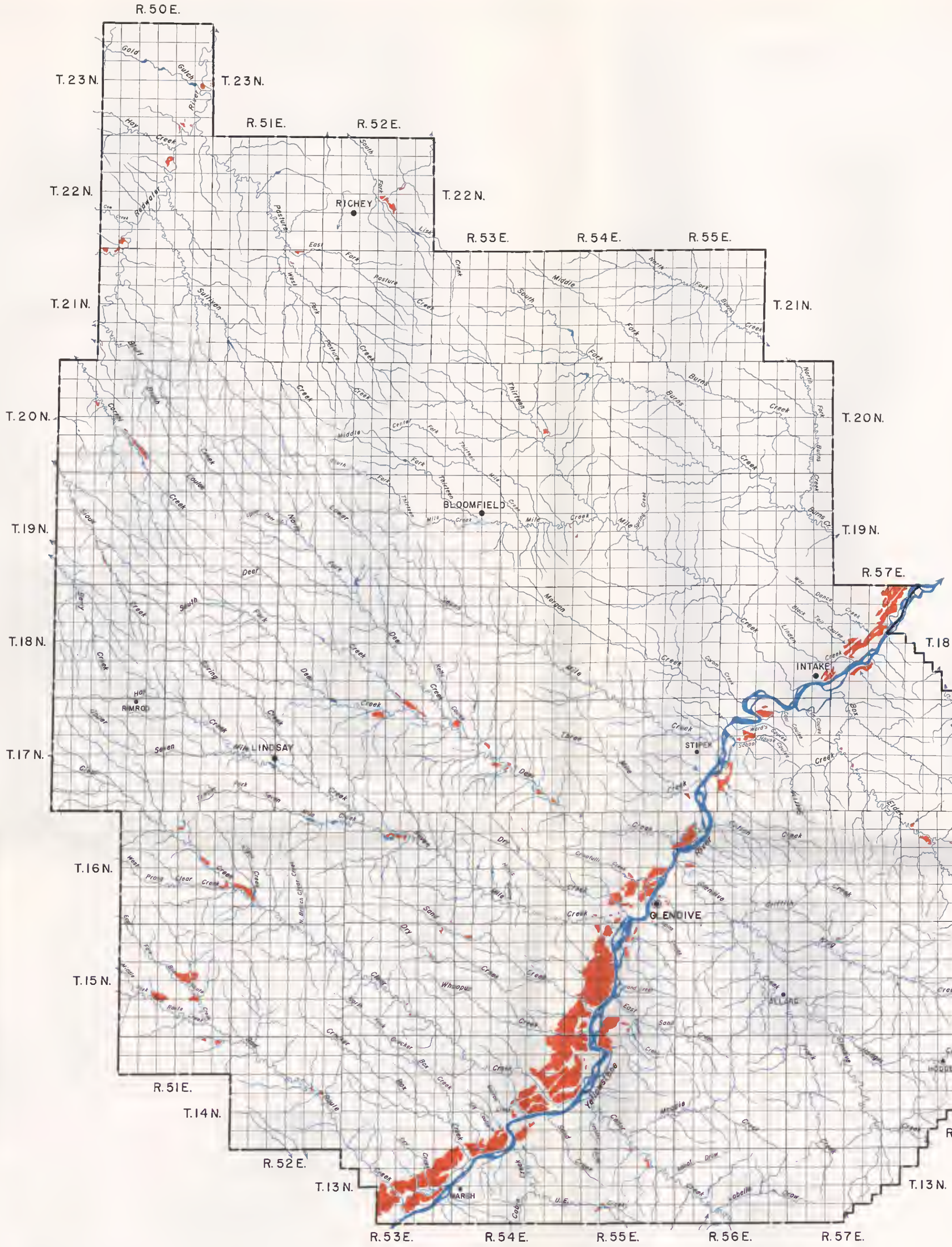
RIVER BASIN	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigated & Irrigable Acres Under Present Facilities
Hudson Bay Drainage Basin			
*Hudson Bay	0.00	0.00	0.00
Nelson River	0.00	0.00	0.00
Lake Winnipeg	0.00	0.00	0.00
Saskatchewan River	0.00	0.00	0.00
Oldman River	0.00	0.00	0.00
St. Mary River	587.00	0.00	587.00
Unnamed Coulee	26.00	0.00	26.00
Kennedy (Otatso) Creek	0.00	71.00	71.00
Willow Creek	0.00	4.00	4.00
Grand Total Hudson Bay Drainage Basin	613.00	75.00	688.00
Missouri River Drainage Basin			
Missouri River	136,438.50	26,967.33	163,405.83
Jefferson River	61,291.00	9,713.00	71,004.00
Beaverhead River	40,771.00	6,076.00	46,847.00
Big Hole River	23,775.00	1,950.00	25,725.00
Madison River	39,445.00	7,660.00	47,105.00
Gallatin River	112,054.00	21,242.00	133,296.00
Smith River	32,934.00	19,679.00	52,613.00
Sun River	124,474.58	4,385.00	128,859.58
Marias River	149,004.42	20,756.88	169,761.30
Teton River	74,653.00	15,882.33	90,535.33
Musselshell River	64,789.00	57,870.00	122,659.00
Milk River	217,402.62	50,044.76	267,447.38
Yellowstone River**	335,079.00	98,257.60	434,336.60
Stillwater River**	30,423.50	8,028.53	38,452.03
Clarks Fork River**	88,160.97	1,530.83	89,691.80
Big Horn River**	65,005.00	23,858.00	88,863.00
Tongue River	28,170.00	7,762.00	35,932.00
Powder River	36,030.00	2,578.00	38,608.00
Little Missouri River	42,513.00	1,499.00	44,012.00
Grand Total Missouri River Basin	1,703,413.59	385,740.26	2,089,153.85
Columbia River Drainage Basin			
Columbia River	0.00	0.00	0.00
Kootenai (Kootenay) River	9,914.13	968.00	10,882.13
Clark Fork (Deer Lodge) (Hellgate) (Missoula) River	156,269.70	17,293.20	173,562.90
Bitterroot River	111,102.43	3,200.00	114,302.43
Flathead River	141,511.19	5,135.22	146,646.41
Little Bitterroot River	15,297.00	337.00	15,634.00
Grand Total Columbia River Basin	434,094.45	26,933.42	461,027.87
GRAND TOTAL COUNTIES COMPLETED TO DATE	2,138,121.04	412,748.68	2,550,869.72

*Name of streams indented on the left-hand margin indicate that they are tributaries of the first stream named above which is not indented.

**Figures in these River Basins revised by resurvey of Carbon County, 1965.

MAP INDEX

All maps have been made from aerial photographs



MONTANA WATER RESOURCES BOARD

DRAINAGE MAP SHOWING IRRIGATED AREAS DAWSON COUNTY

COMPILED FROM DATA AVAILABLE AS OF DECEMBER 1, 1970

Compiled from Aerial Photographs, Water Right Data, Government Land Office Surveys and Field Investigations.

Drafted by: Hugh D. Greenup & Daniel R. Erving

MAP SYMBOL INDEX

BOUNDARIES

- INTERNATIONAL
- STATE
- COUNTY
- NATIONAL FOREST

DITCHES

- CANALS OR DITCHES
- DRAIN DITCHES

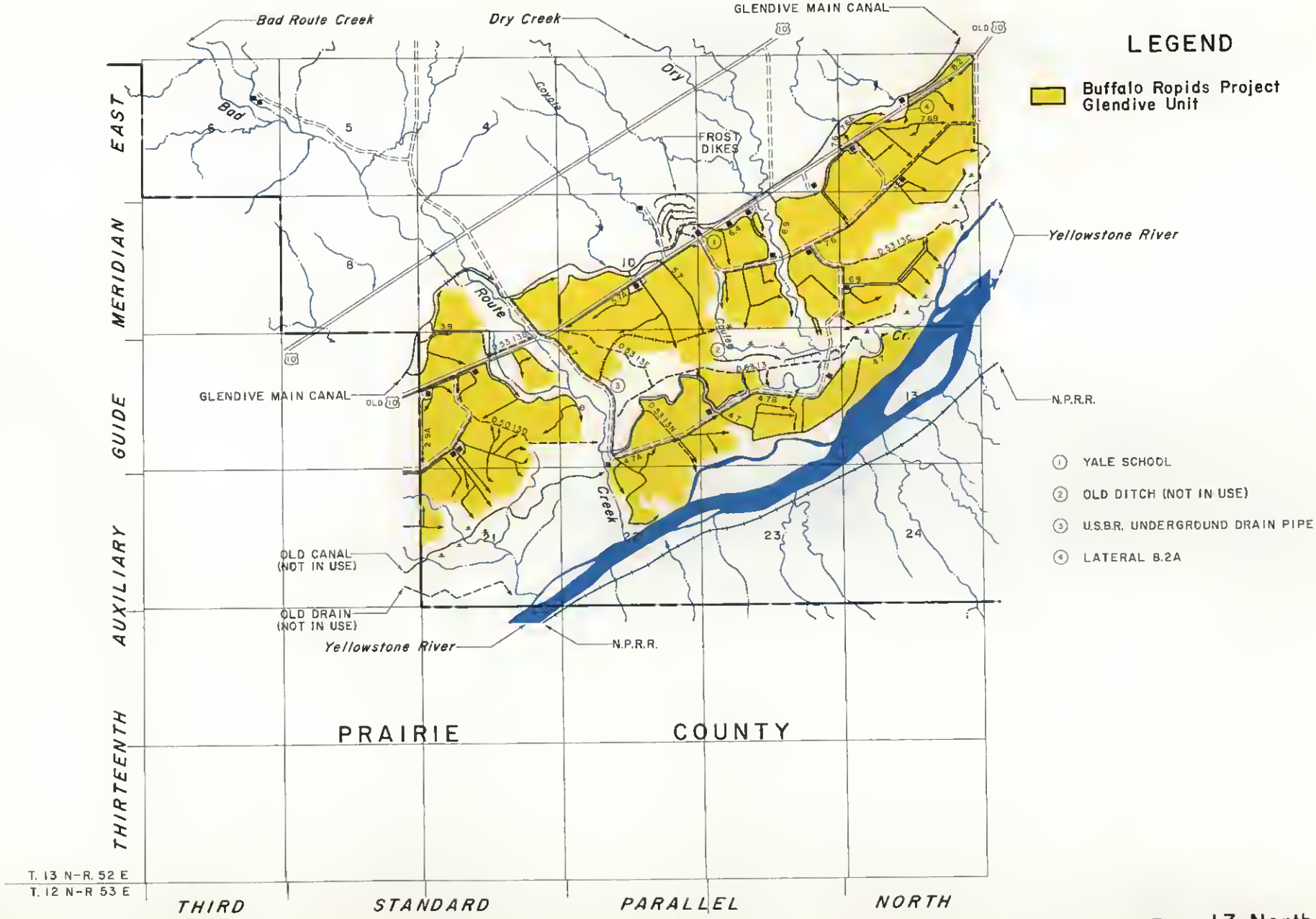
TRANSPORTATION

- PAVED ROADS
- UNPAVED ROADS
- RAILROADS
- STATE HIGHWAY
- U.S. HIGHWAY
- INTERSTATE HIGHWAY
- AIRPORT
- LANDING STRIP

STRUCTURES & UNITS

- DAM
- DIKE
- FLUME
- SIPHON
- SPILL
- SPRINKLER SYSTEM
- WEIR
- PIPE LINE
- PUMP
- PUMP SITE
- WELL
- ARTESIAN WELL
- NATURAL CARRIER USED AS DITCH
- SPRING
- RESERVOIR
- SWAMP
- GAUGING STATION
- POWER PLANT
- STORAGE TANK
- CEMETERY
- FAIRGROUNDS
- FARM OR RANCH UNIT
- SCHOOL
- LOOKOUT STATION
- RANGER STATION
- BRIDGE
- RAILROAD TUNNEL
- REST AREA
- SHAFT, MINE, OR GRAVEL PIT
- OIL WELL OR OIL FIELD

10-20-69

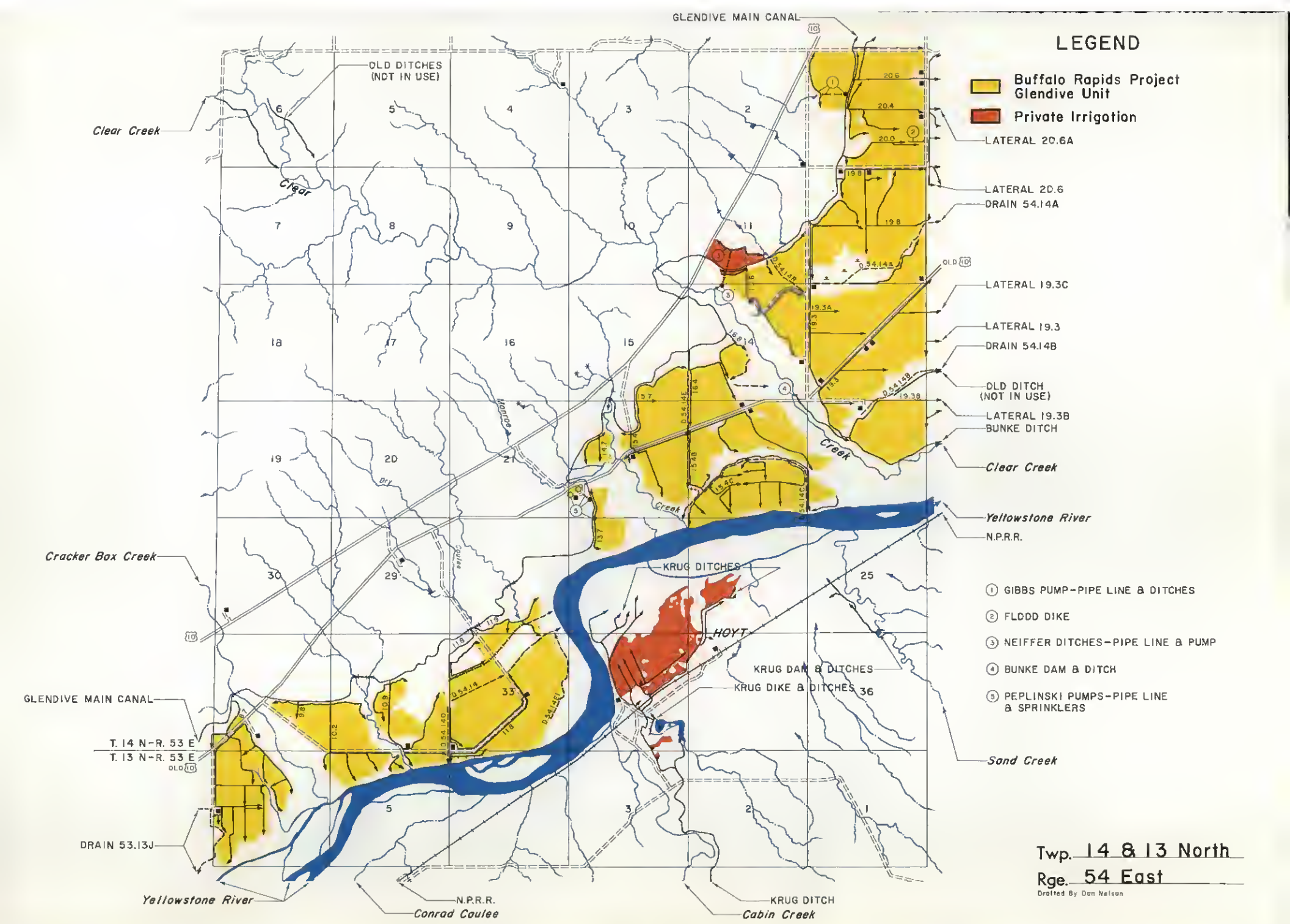


Twp. 13 North

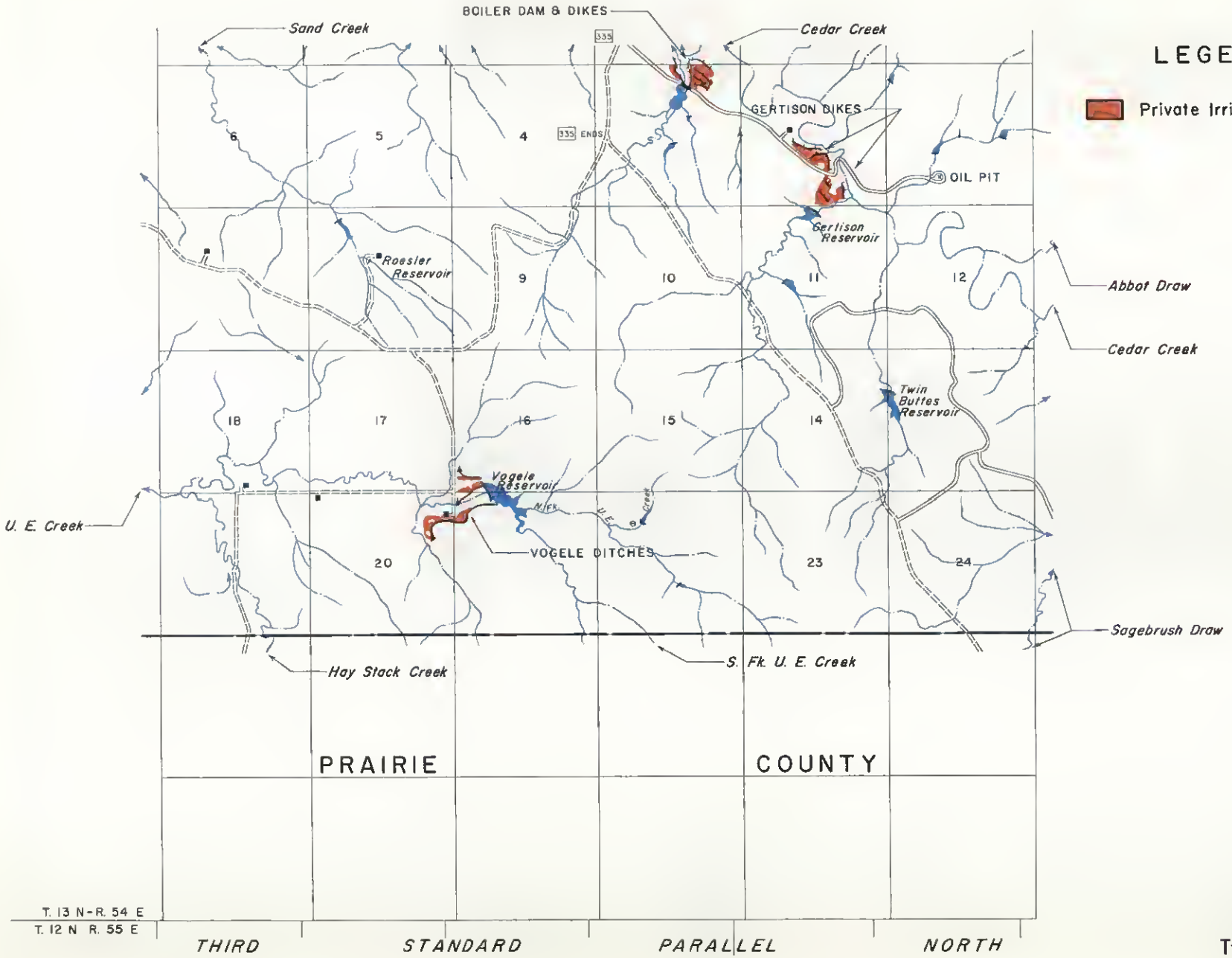
Rge. 53 East

Drafted By Dan Nelson

T1


GLENDIVE MAIN CANAL
OLD DITCHES (NOT IN USE)
Clear Creek
LATERAL 20.6A
LATERAL 20.6
DRAIN 54.14A
LATERAL 19.3C
LATERAL 19.3
DRAIN 54.14B
OLD DITCH (NOT IN USE)
LATERAL 19.3B
BUNKE DITCH
Clear Creek
Yellowstone River
N.P.R.R.
Cracker Box Creek
KRUG DITCHES
HOYT
KRUG DAM & DITCHES
KRUG DIKE & DITCHES
GLENDIVE MAIN CANAL
T. 14 N-R. 53 E
T. 13 N-R. 53 E
DRAIN 53.13J
Yellowstone River
N.P.R.R.
Conrad Coulee
KRUG DITCH
Cabin Creek
Sand Creek
LEGEND
Buffalo Rapids Project Glendive Unit
Private Irrigation
① GIBBS PUMP-PIPE LINE & DITCHES
② FLOOD DIKE
③ NEIFFER DITCHES-PIPE LINE & PUMP
④ BUNKE DAM & DITCH
⑤ PEPLINSKI PUMPS-PIPE LINE & SPRINKLERS
Twp. 14 & 13 North
Rge. 54 East
Drafted By Dan Nelson

T2



LEGEND

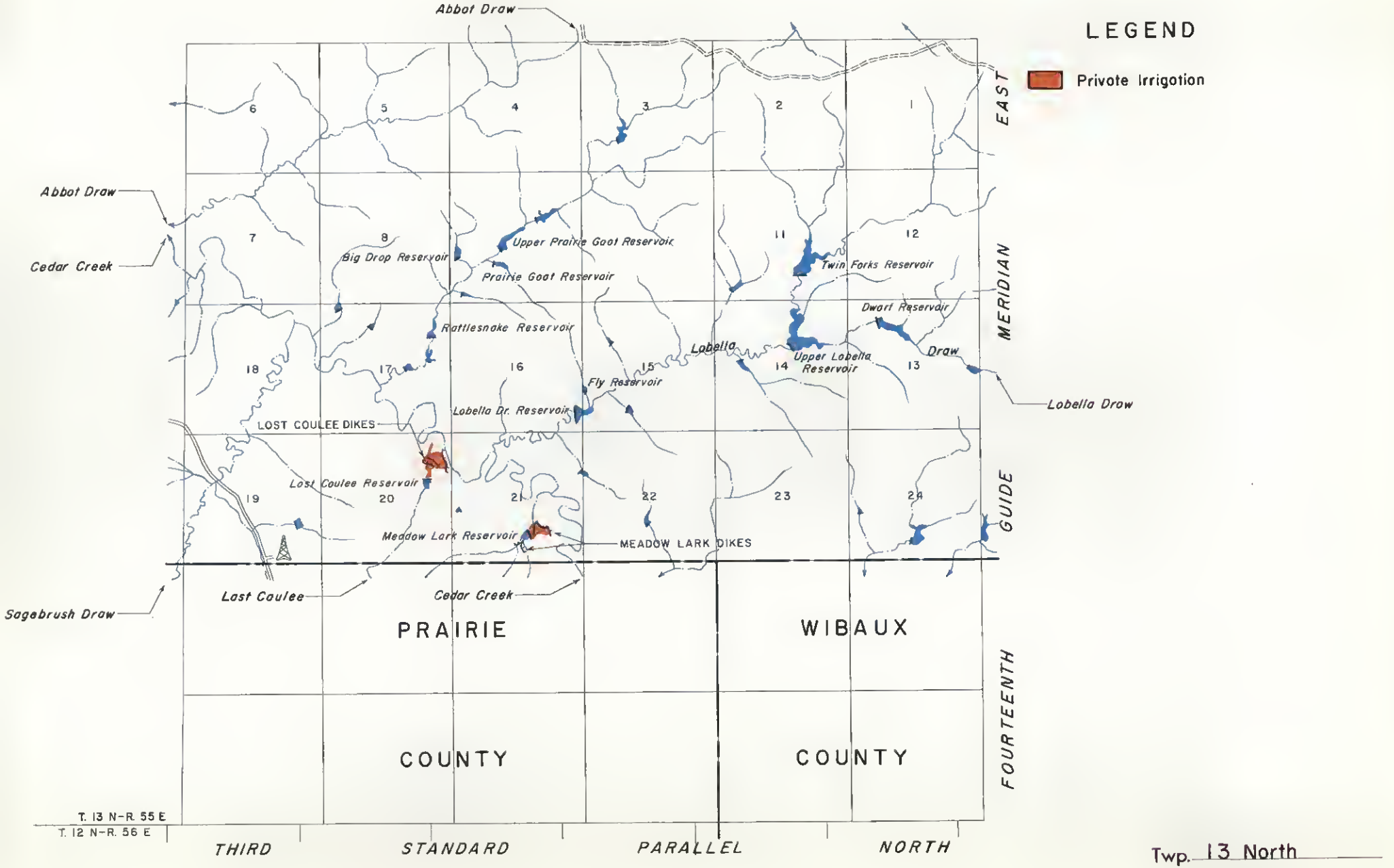
Private Irrigation

Twp. 13 North

Rge. 55 East

Drafted by James W Sharkey

T3



LEGEND

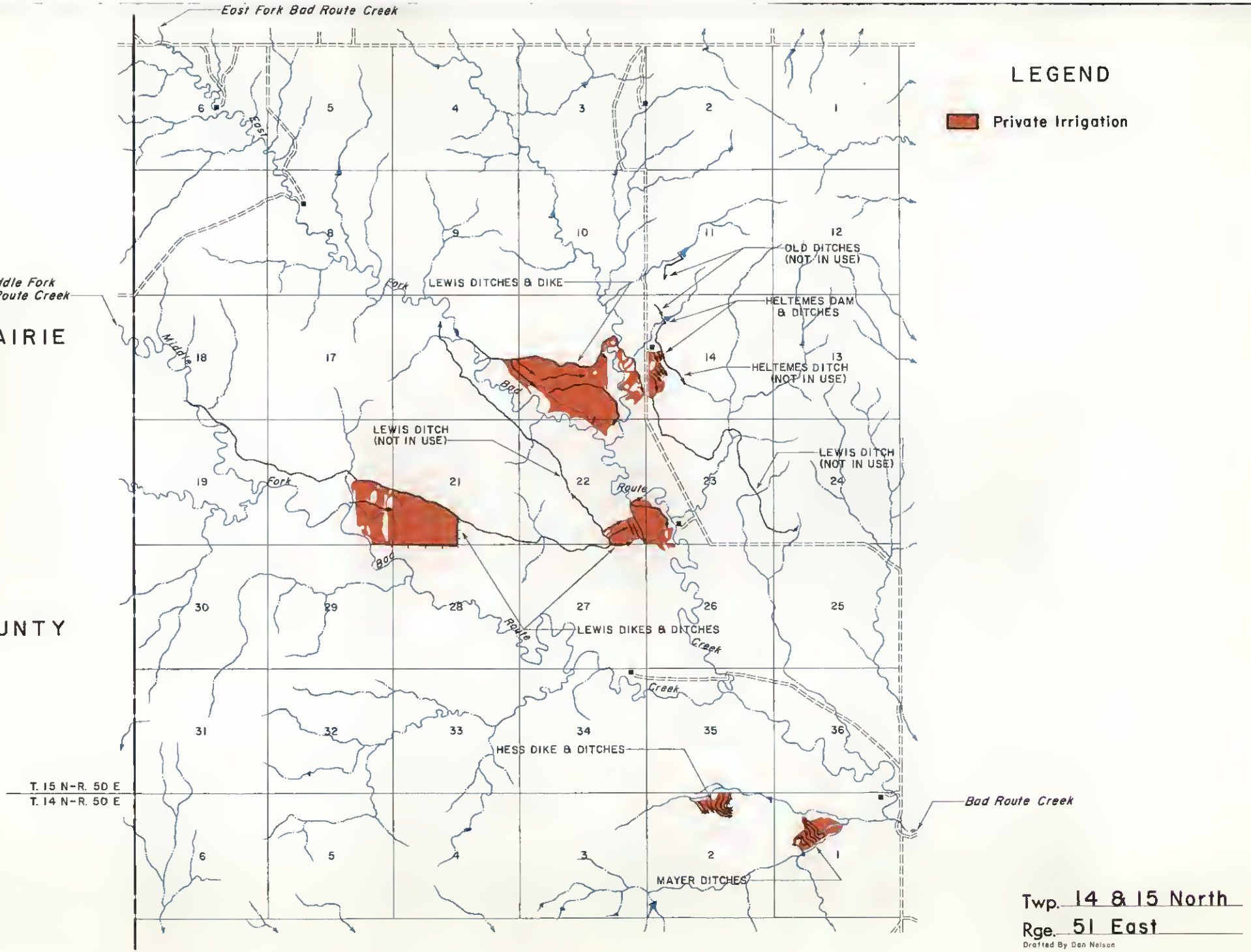
Private Irrigation

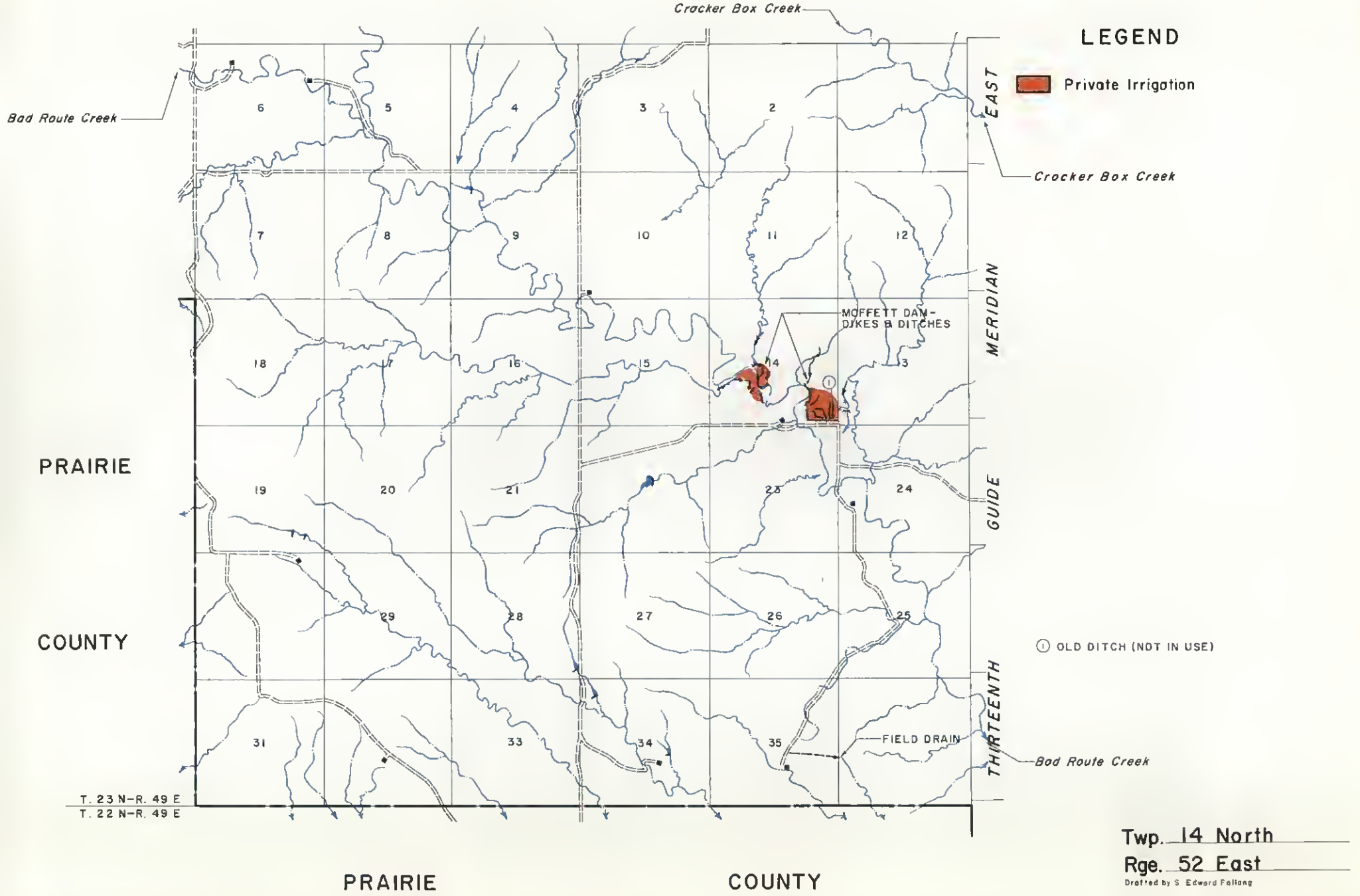
Twp. 13 North

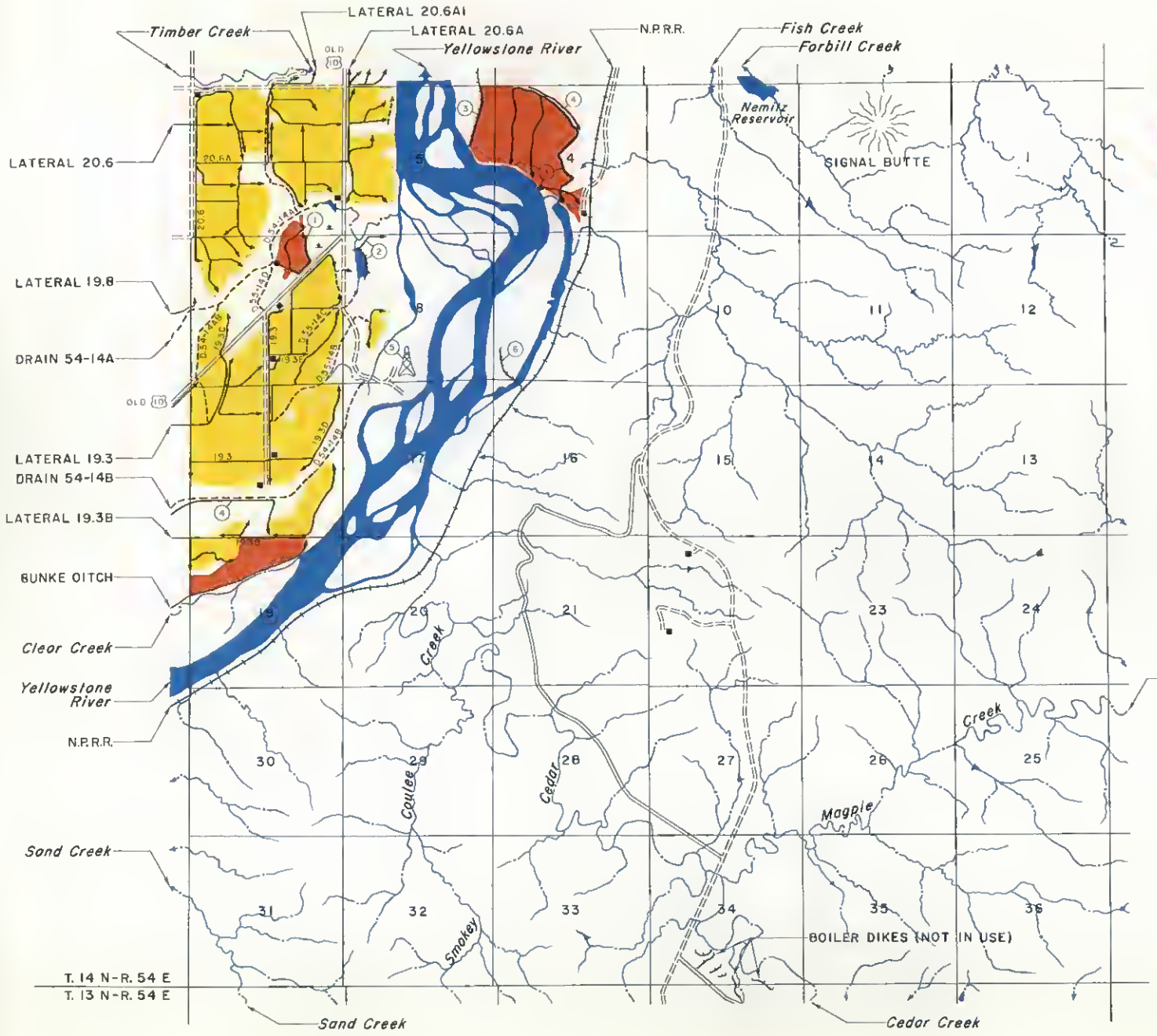
Rge. 56 East

Drafted by James W Shorkey

T4


East Fork Bad Route Creek
Middle Fork Bad Route Creek
PRAIRIE
COUNTY
T. 15 N-R. 50 E
T. 14 N-R. 50 E
LEWIS DITCHES & DIKE
OLD DITCHES (NOT IN USE)
HELTEMES DAM & DITCHES
HELTEMES DITCH (NOT IN USE)
LEWIS DITCH (NOT IN USE)
LEWIS DITCH (NOT IN USE)
LEWIS DIKES & DITCHES
HESS DIKE & DITCHES
MAYER DITCHES
Bad Route Creek
LEGEND
Private Irrigation
Twp. 14 & 15 North
Rge. 51 East
Drafted By Don Nelson
T5


Crocker Box Creek
Bad Route Creek
LEGEND
Private Irrigation
EAST
MERIDIAN
Crocker Box Creek
MOFFETT DAM-
DIKES & DITCHES
PRAIRIE
COUNTY
GUIDE
THIRTEENTH
OLD DITCH (NOT IN USE)
FIELD DRAIN
Bad Route Creek
T. 23 N-R. 49 E
T. 22 N-R. 49 E
PRAIRIE
COUNTY
Twp. 14 North
Rge. 52 East
Drafted by S. Edward Fellang



LEGEND

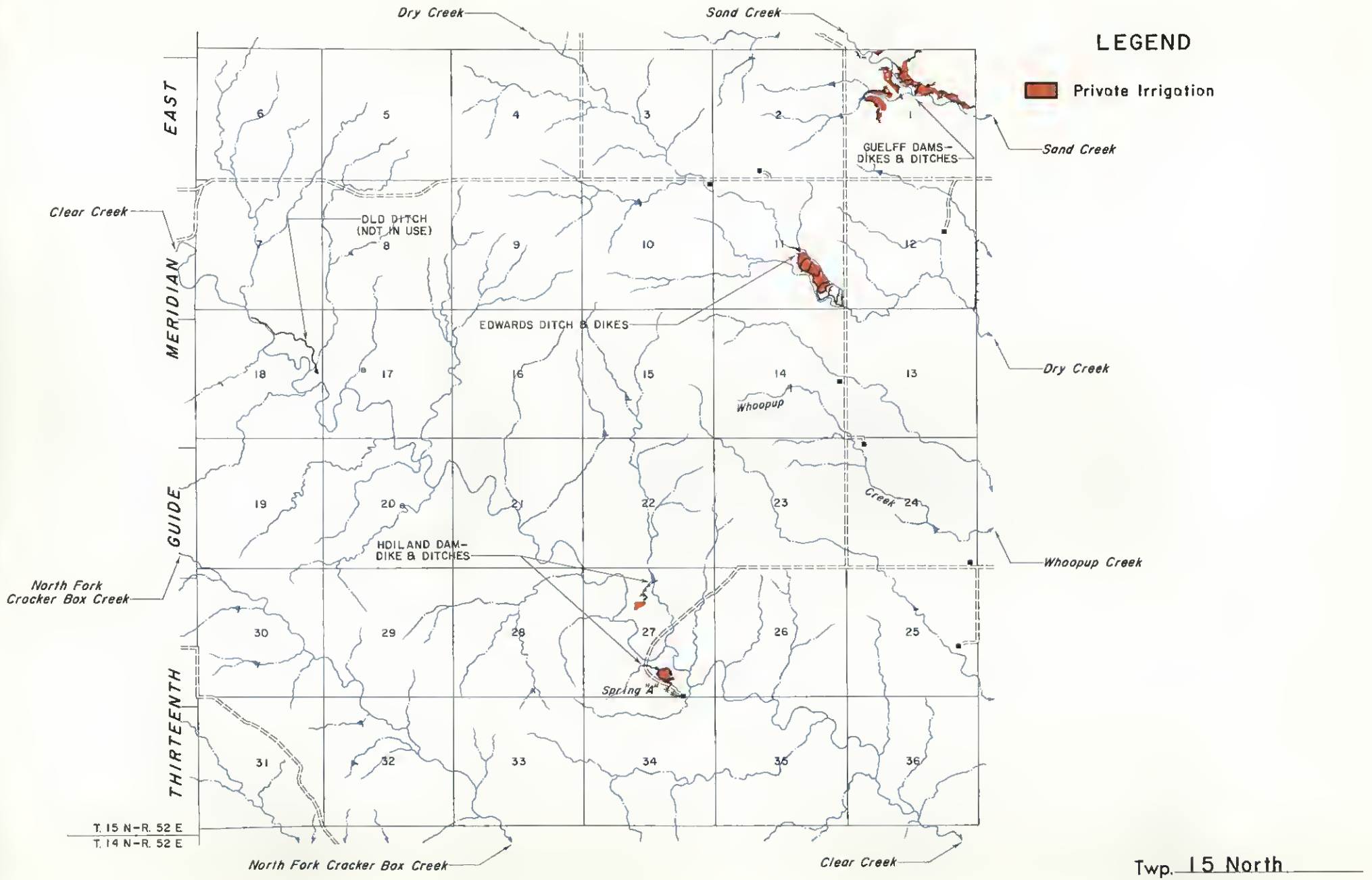
- Buffalo Rapids Project Glendive Unit
- Private Irrigation

1. SURA PUMP & DITCHES
2. TRANGMOE OAM-DITCH & DIKE (NOT IN USE)
3. CEDAR CREEK GRAZING ASSOCIATION PUMPS-DITCHES & DIKE
4. OLD DITCH (NOT IN USE)
5. GLENDIVE OIL FIELD
6. CEDAR CREEK GRAZING ASSOCIATION FLOOD CONTROL DAM & DIKE

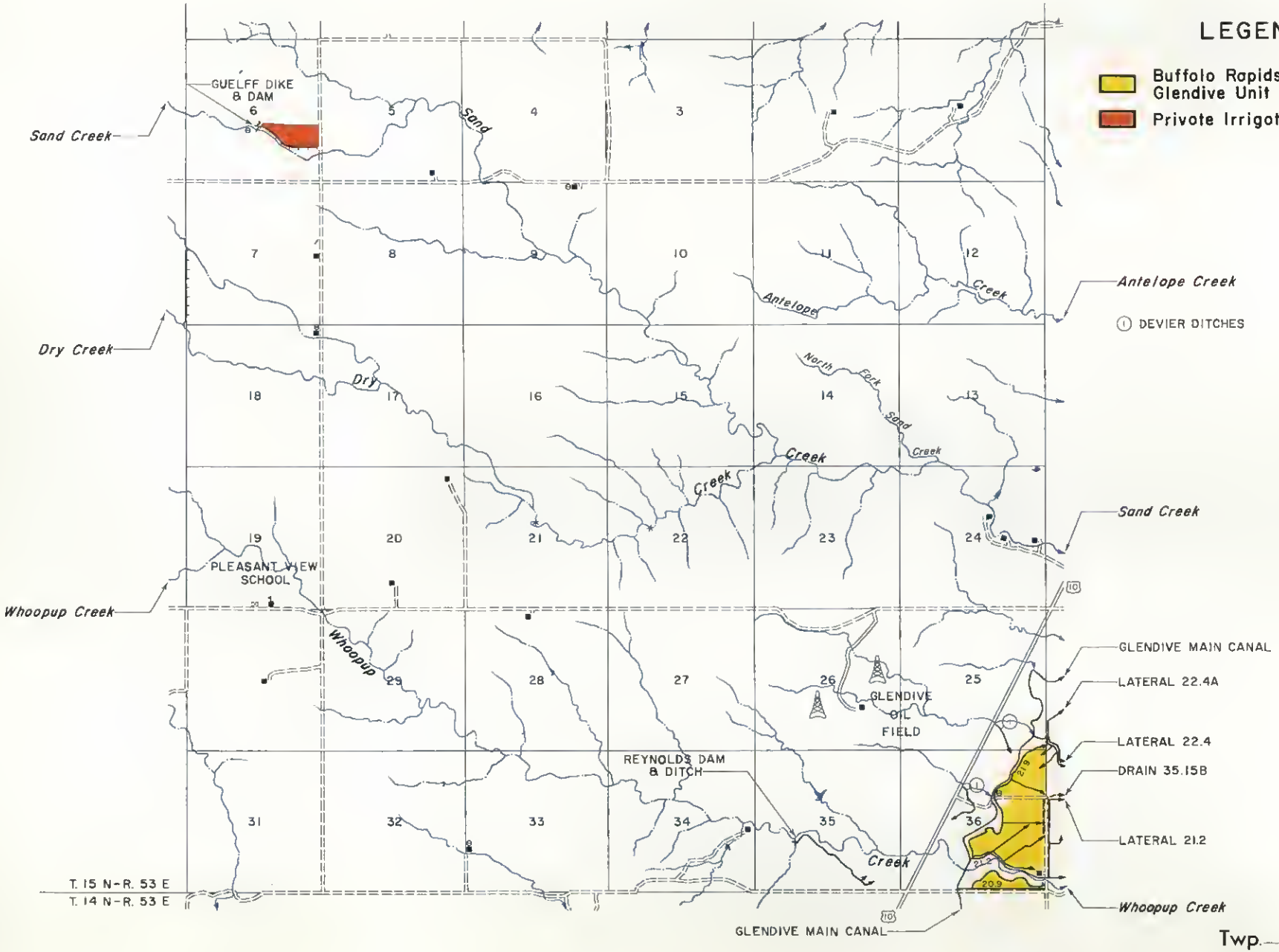
Twp. 14 North
Rge. 55 East

Drafted By Hugh D. Greenup

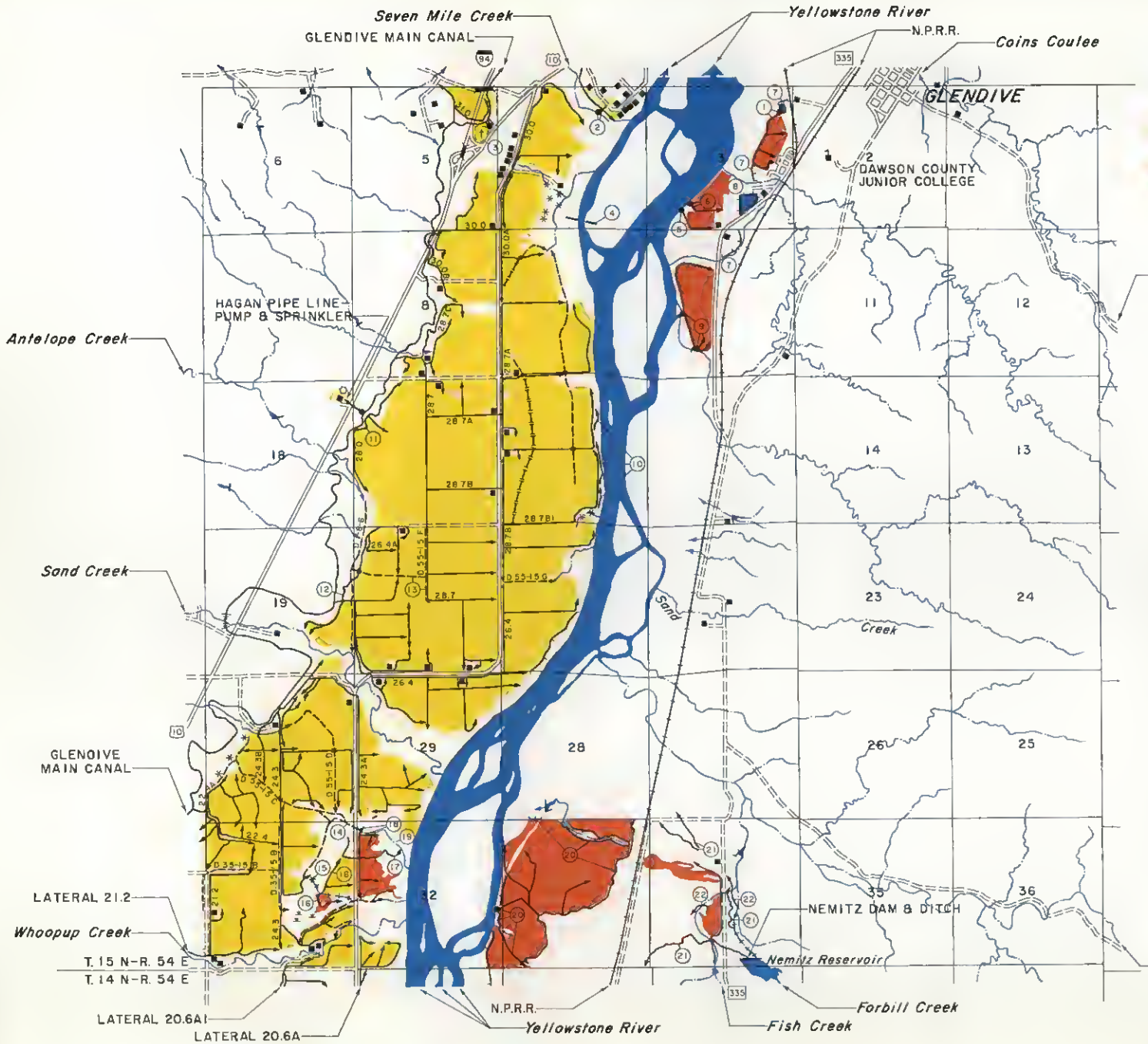
T7


Dry Creek
Sand Creek
LEGEND
Private Irrigation
Sand Creek
GUELFF DAMS-
DIKES & DITCHES
Clear Creek
OLD DITCH
(NOT IN USE)
EDWARDS DITCH & DIKES
Dry Creek
Whoopup
Creek
Whoopup Creek
HOILAND DAM-
DIKE & DITCHES
North Fork
Crocker Box Creek
Spring "A"
EAST
MERIDIAN
GUIDE
THIRTEENTH
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
T. 15 N-R. 52 E
T. 14 N-R. 52 E
North Fork Cracker Box Creek
Clear Creek
Twp. 15 North
Rge. 53 East
Drafted By Don Nelson

T8


LEGEND
Buffalo Rapids Project Glendive Unit
Private Irrigation
GUELFF DIKE & DAM
Sand Creek
Dry Creek
Whoopup Creek
Antelope Creek
① DEVIER DITCHES
Sand Creek
PLEASANT VIEW SCHOOL
GLENDIVE MAIN CANAL
LATERAL 22.4A
LATERAL 22.4
DRAIN 35.15B
LATERAL 21.2
GLENDIVE OIL FIELD
REYNOLDS DAM & DITCH
Whoopup Creek
GLENDIVE MAIN CANAL
T. 15 N-R. 53 E
T. 14 N-R. 53 E
Twp. 15 North
Rge. 54 East
Drafted By Don Nelson

T9



LEGEND

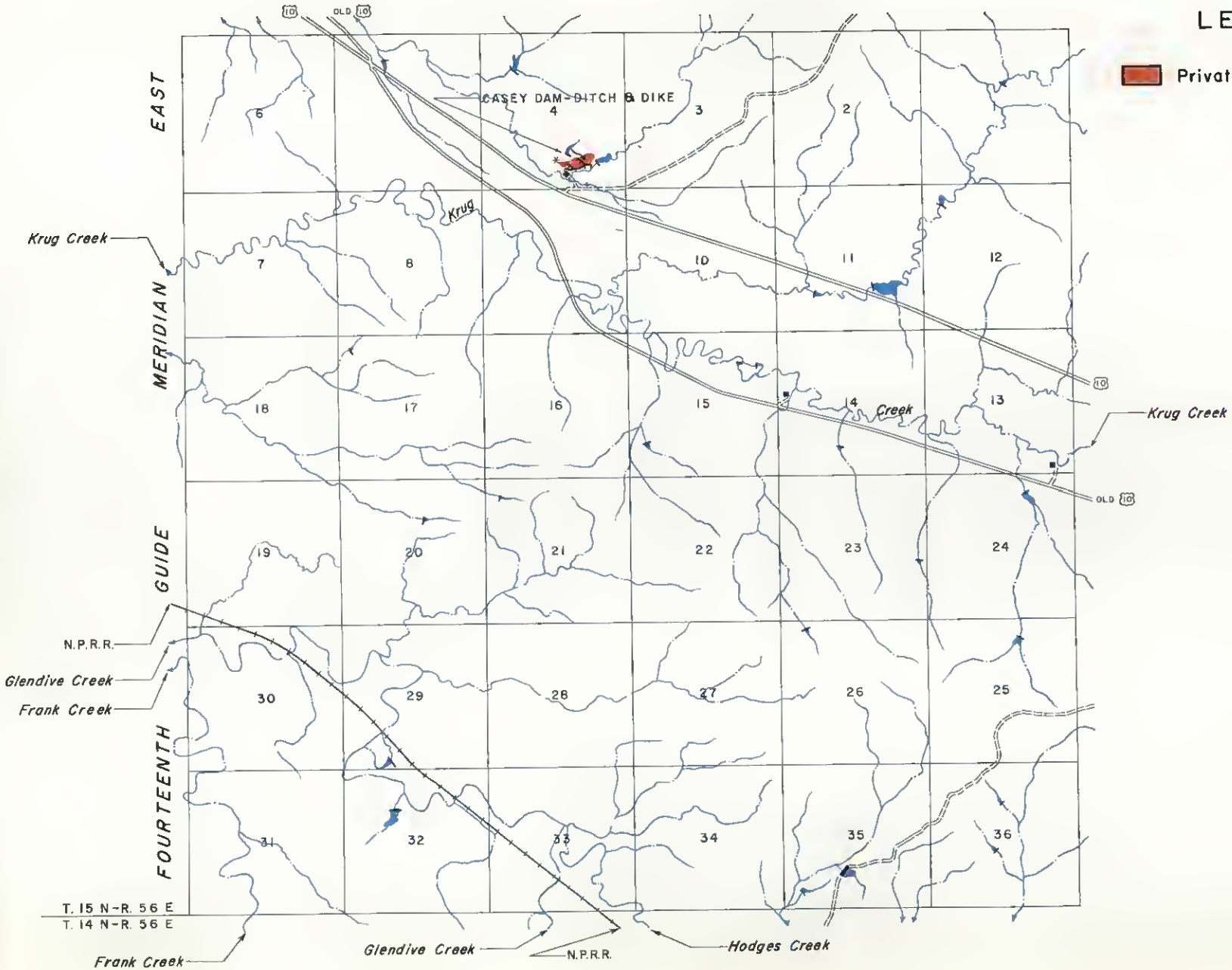
- Buffalo Rapids Project Glendive Unit
- Private Irrigation

1. GEHNERT PUMP–DITCHES & SUMP
2. KIRK PUMP & PIPE LINE
3. SUNSET MEMORIAL GARDENS
4. OLD DAM (NOT IN USE)
5. CULLINAN PUMP & DITCH
6. BRENNER PUMP & DITCH
7. FLOOD DIKES
8. SEWAGE LAGOON
9. ENGLE DAM–PUMPS & DITCHES
10. OLD DITCHES (NOT IN USE)
11. LATERAL 28.0A
12. LATERAL 26.4A
13. DRAIN 55-15 E
14. DRAIN 55-15 C 3
15. GUELFF SPRING
16. TRANGMOE DITCH
17. OLD DITCH (NOT IN USE)
18. GUELFF DAM & DITCHES
19. CUNNINGHAM CREEK
20. NEMITZ PUMP DITCHES & DIKES
21. FORBILL DITCHES (NOT IN USE)
22. NEMITZ DITCHES (NOT IN USE)

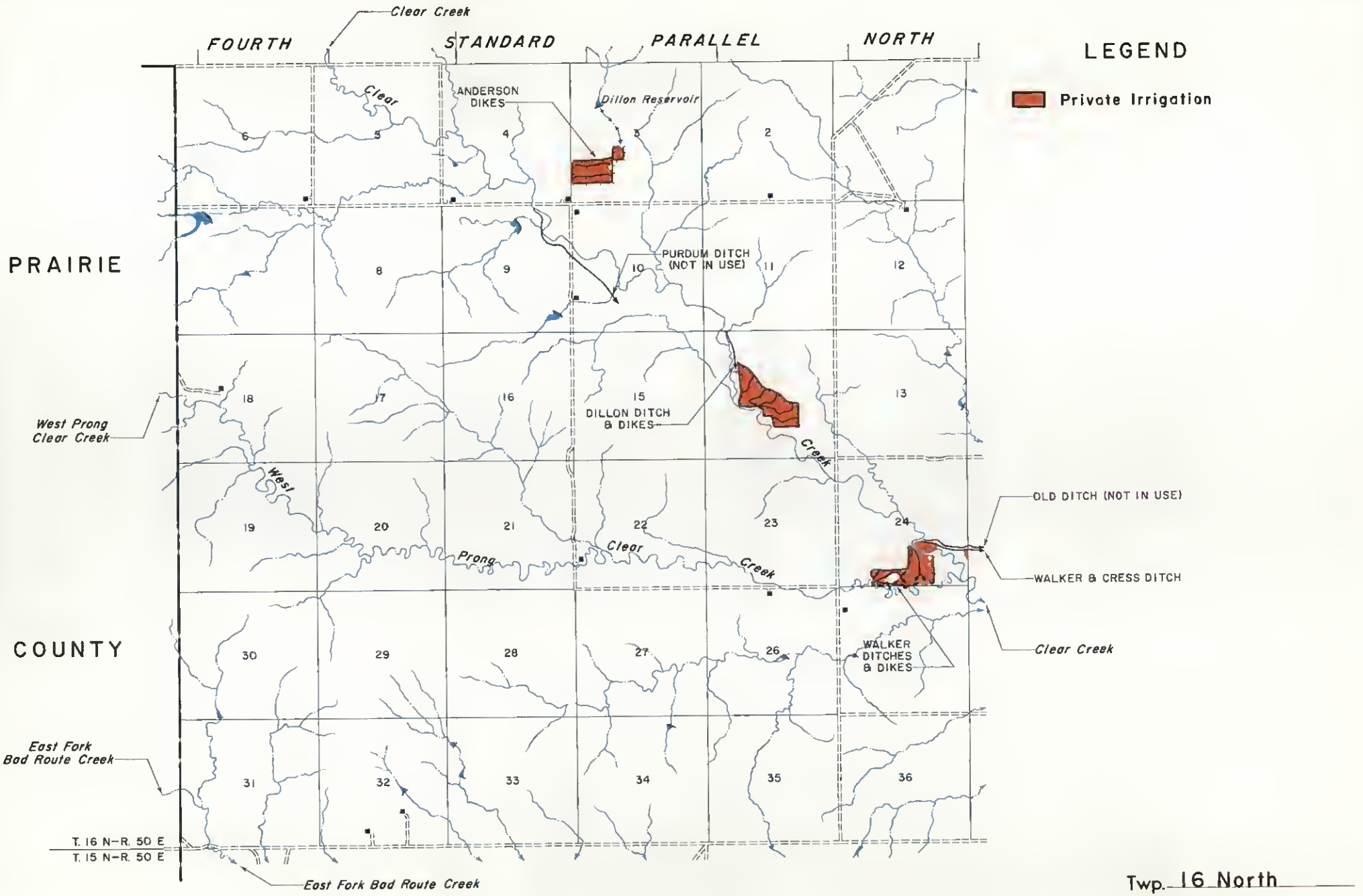
Twp. 15 North
Rge. 55 East

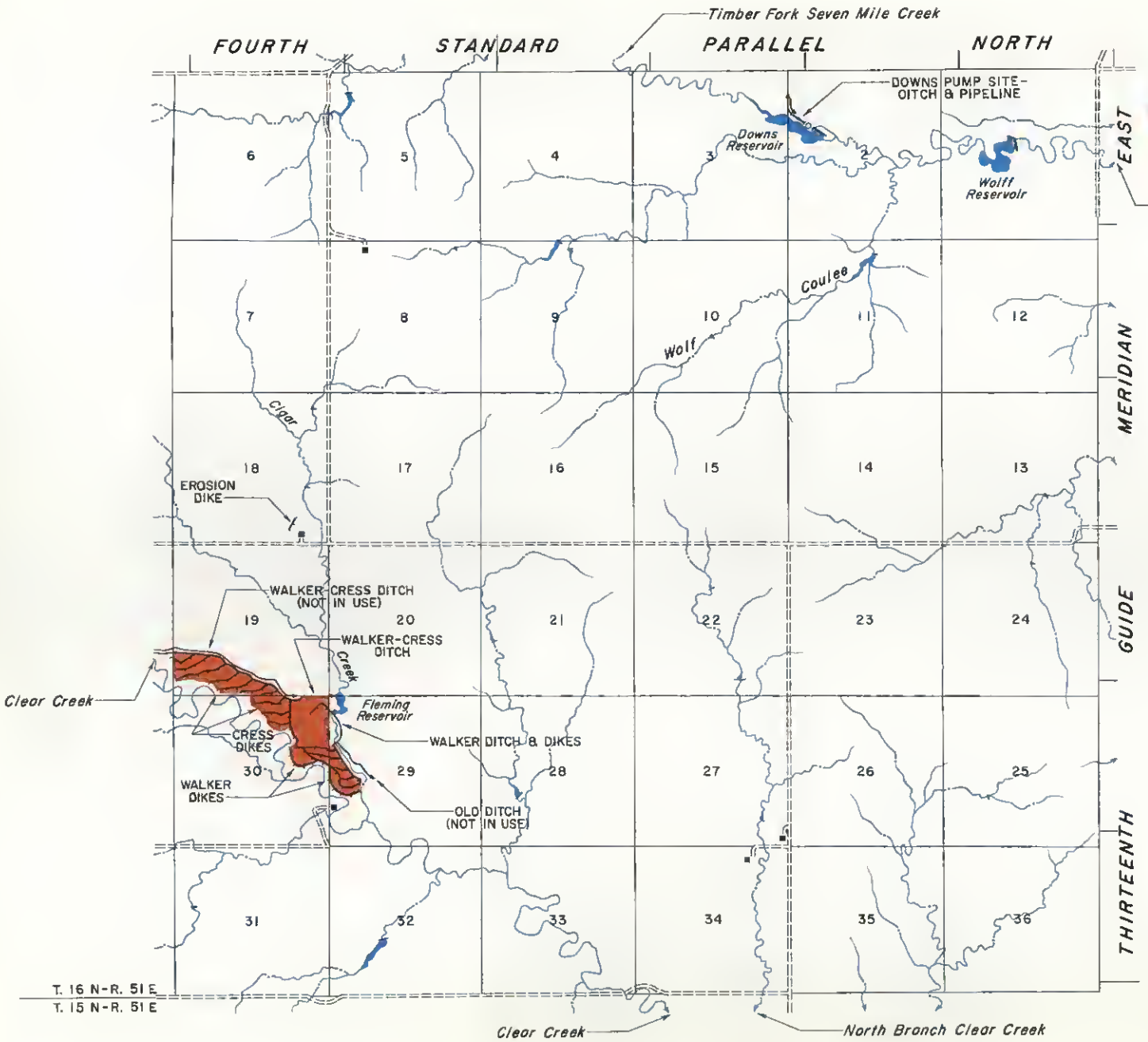
Drafted By Dan Nelson

T10


LEGEND
Private Irrigation
CASEY DAM-DITCH & DIKE
EAST
MERIDIAN
GUIDE
FOURTEENTH
Krug Creek
Krug
Creek
N.P.R.R.
Glendive Creek
Frank Creek
Hodges Creek
OLD 10
10
T. 15 N-R. 56 E
T. 14 N-R. 56 E
Twp. 15 North
Rge. 57 East
Drafted by James W. Sharkey

T11


FOURTH STANDARD PARALLEL NORTH
Clear Creek
Clear
ANDERSON DIKES
Dillon Reservoir
PURDUM DITCH (NOT IN USE)
DILLON DITCH & DIKES
West Prong Clear Creek
West Prong Clear Creek
Clear Creek
OLD DITCH (NOT IN USE)
WALKER & CRESS DITCH
Clear Creek
WALKER DITCHES & DIKES
East Fork Bad Route Creek
East Fork Bad Route Creek
PRAIRIE
COUNTY
T. 16 N–R. 50 E
T. 15 N–R. 50 E
1 2 3 4 5 6
7 8 9 10 11 12
13 15 16 17 18
19 20 21 22 23 24
25 26 27 28 29 30
31 32 33 34 35 36
LEGEND
Private Irrigation
Twp. 16 North
Rge. 51 East
Drafted By Don Nelson
T12



LEGEND

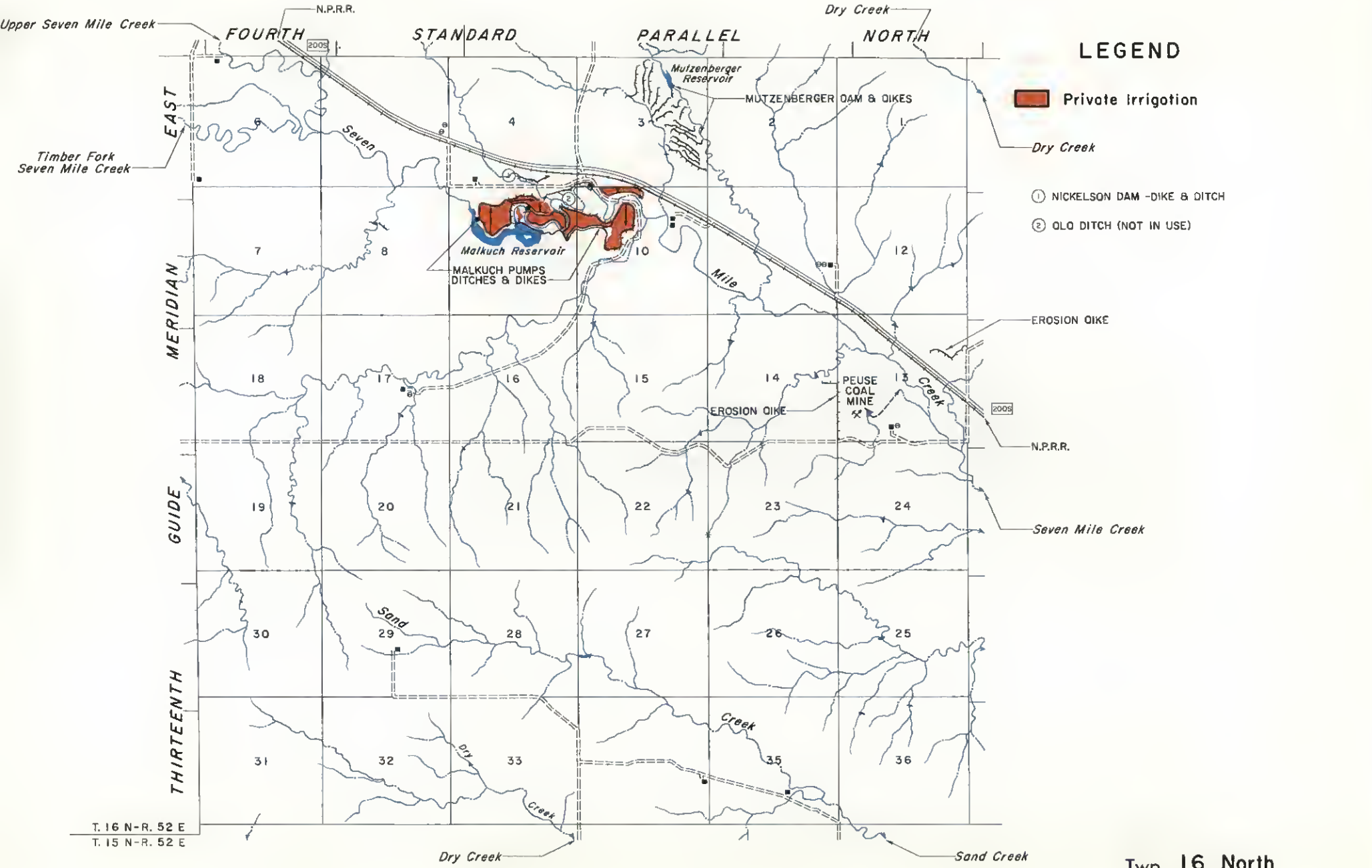
Private Irrigation

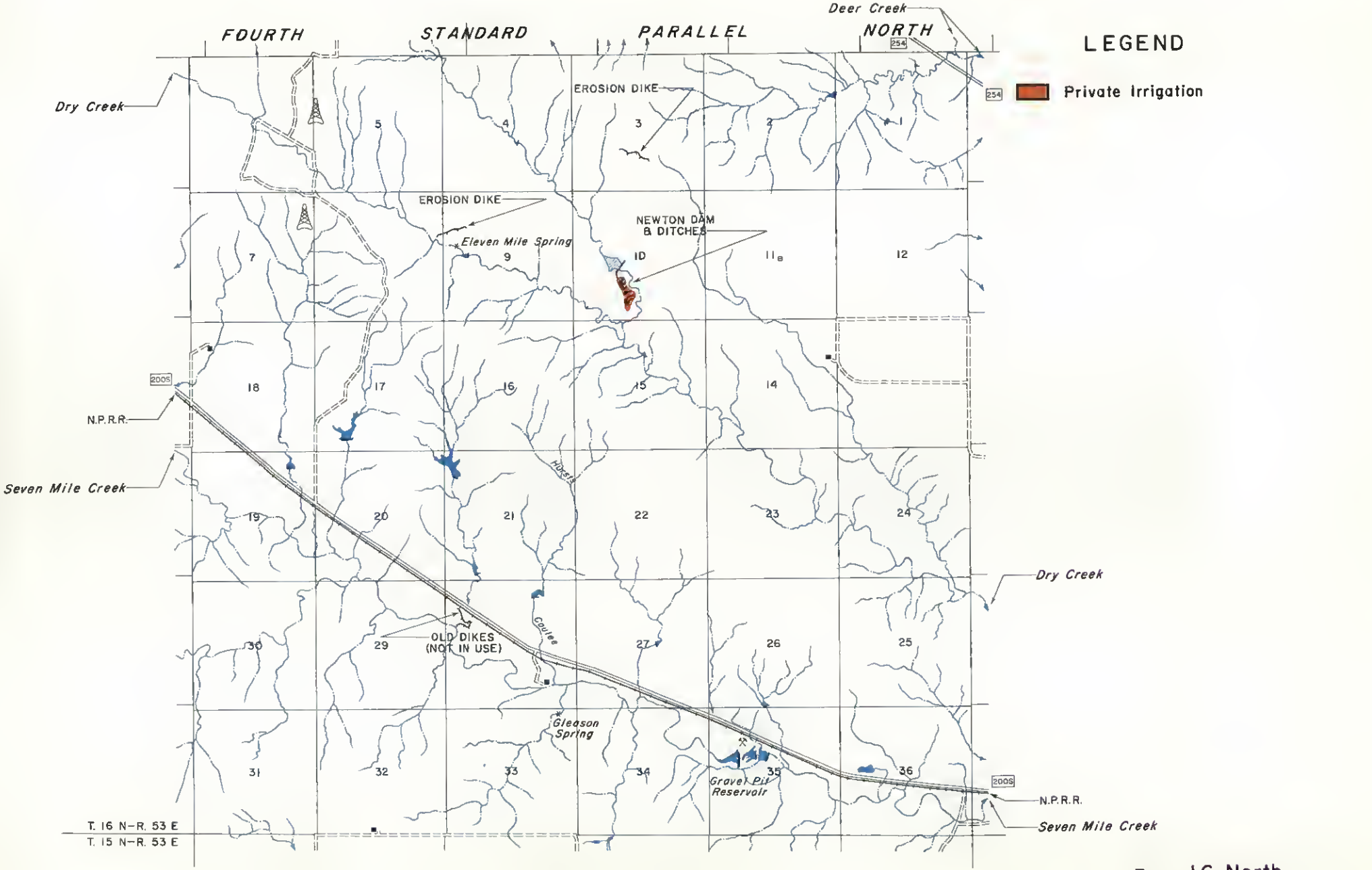
Twp. 16 North

Rge. 52 East

Drafted By Hugh D. Greenup

T13


Upper Seven Mile Creek
N.P.R.R.
FOURTH STANDARD PARALLEL NORTH
Dry Creek
EAST
SIXTH MERIDIAN
GUIDE
THIRTEENTH
Timber Fork Seven Mile Creek
Seven
Mutzenberger Reservoir
MUTZENBERGER DAM & DIKES
Dry Creek
① NICKELSON DAM -DIKE & DITCH
② OLO DITCH (NOT IN USE)
Malkuch Reservoir
MALKUCH PUMPS DITCHES & DIKES
Mile
EROSION DIKE
PEUSE COAL MINE
EROSION DIKE
Creek
N.P.R.R.
Seven Mile Creek
Sand
Creek
Dry
Creek
Dry Creek
Sand Creek
T. 16 N-R. 52 E
T. 15 N-R. 52 E
LEGEND
Private Irrigation
Twp. 16 North
Rge. 53 East
Drafted By Hugh D. Greenup
T14



Twp. 16 North

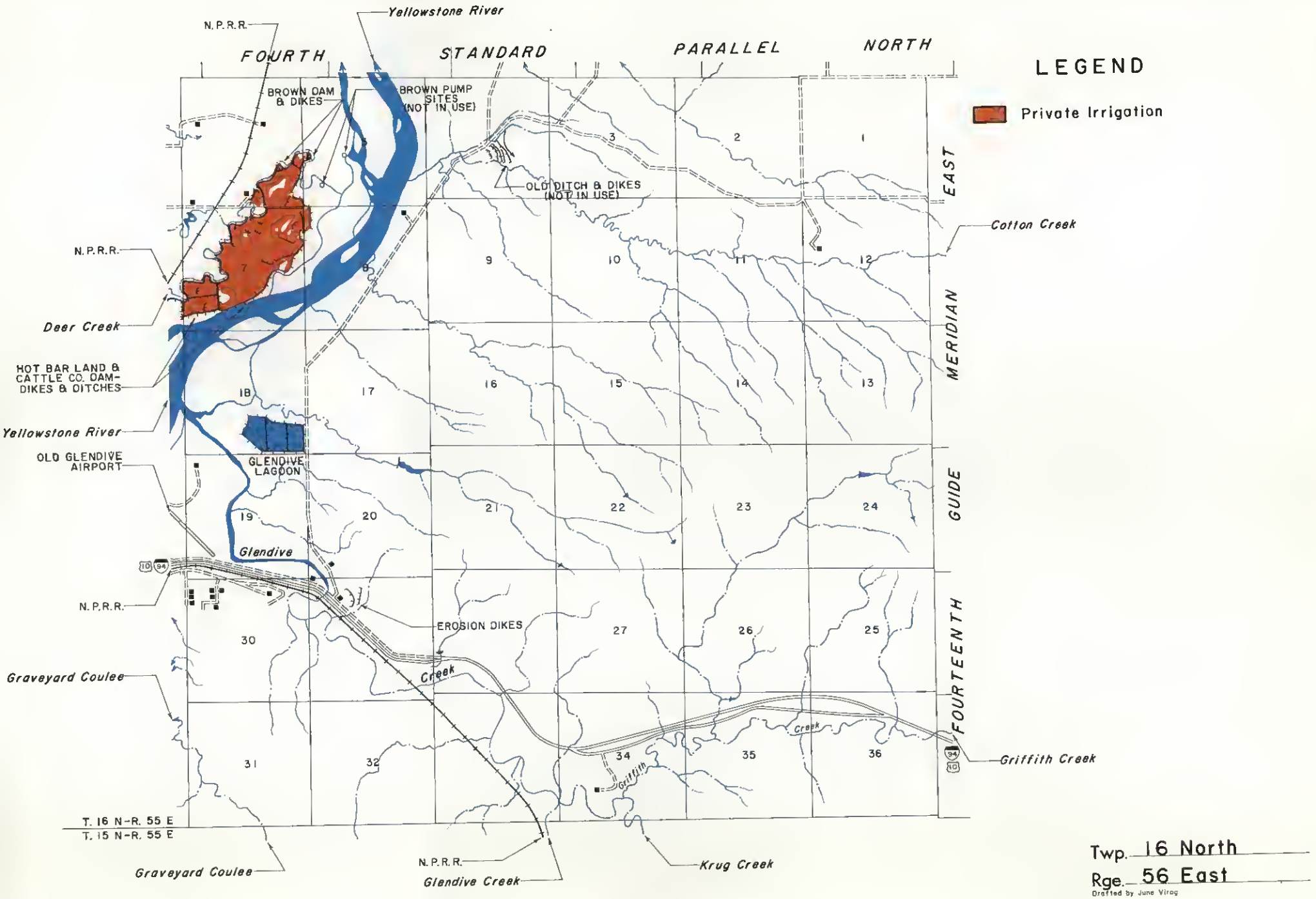
Rge. 54 East

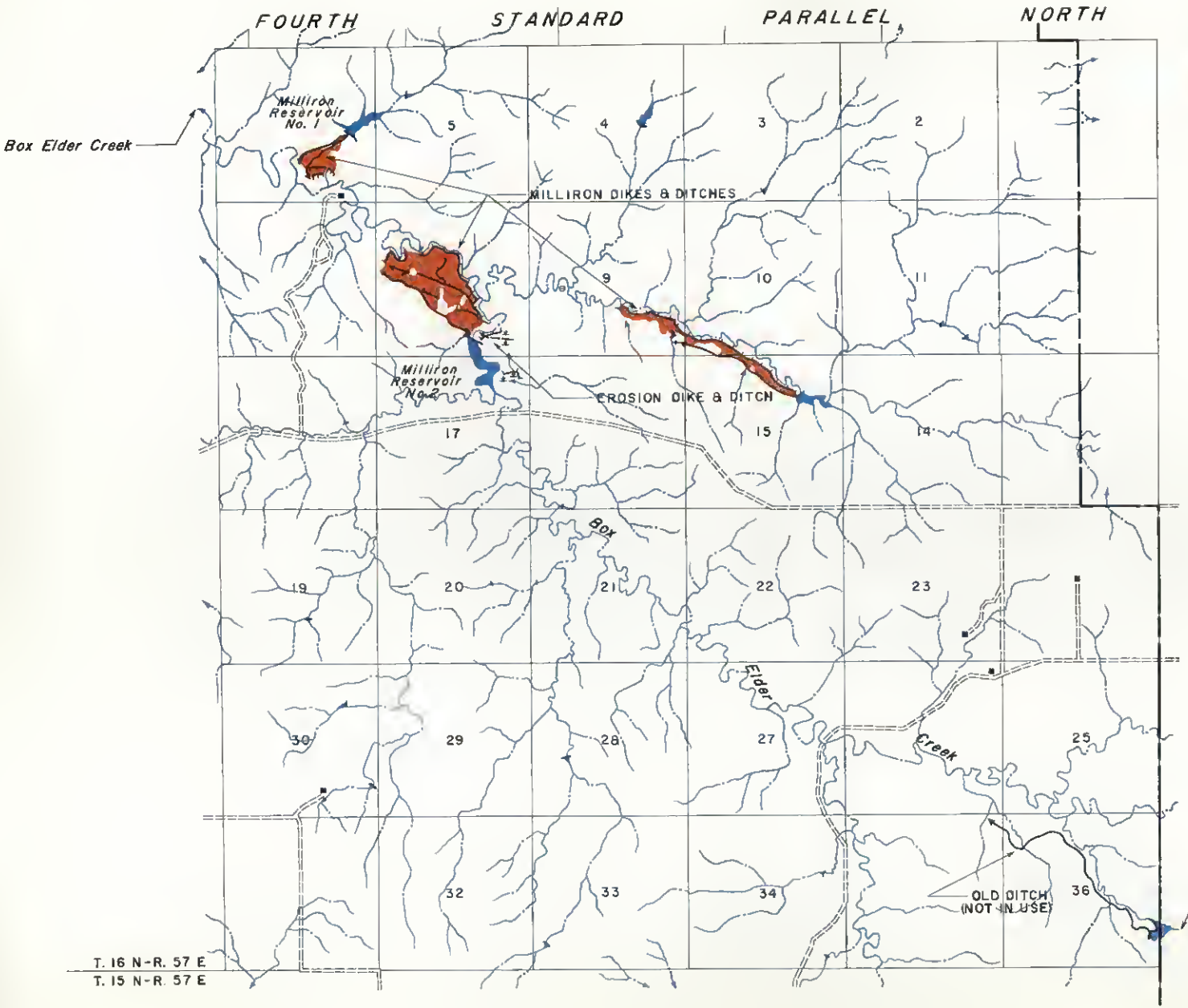
Drafted By Dan Nelson

T15

Deer Creek
FOURTH STANDARD PARALLEL NORTH
NEWTON DIKES & DITCH
J. RAHR PUMP & PIPE LINE
OLO DIKES (NOT IN USE)
S. RAHR DIKES & DITCH (NOT IN USE)
DEER CREEK SCHOOL
N.P.R.R.
Deer Creek
SCHEPENS PUMP & DIKES
Yellowstone River
DAWSON COMMUNITY AIRPORT
Crisafulli Creek
LATERAL 34.8B (NOT IN USE)
Garden Coulee
Country Club Reservoir
Hollecker Reservoir
Dry Creek
Spring Creek
MAIN CANAL
Dry Creek
GLENDIVE
N.P.R.R.
Seven Mile Creek
T. 16 N - R. 54 E
T. 15 N - R. 54 E
GLENDIVE MAIN CANAL WASTEWAY
GLENDIVE MAIN CANAL
LATERAL 30.0
Seven Mile Creek
Yellowstone River
N.P.R.R.
Coins Coulee
Graveyard Coulee
LEGEND
Buffalo Rapids Project Glendive Unit
Private Irrigation
(1) DAWSON COUNTY FAIRGROUNDS
(2) DAWSON COUNTY PUMP-PIPE LINE & SPRINKLER
(3) OLO GLENDIVE AIRPORT
(4) FLOOD DIKE
(5) LATERAL 34.5F
(6) GLENDIVE SEWAGE LAGOON
(7) DOHRMAN PUMP & SPRINKLERS
(8) CRISAFULLI PUMPS-DITCHES & DIKES
(9) KRUG PUMP SITE-PIPE LINE & DITCH (NOT IN USE)
(10) OAWE PUMP
(11) CITY OF GLENDIVE SPRINKLERS & PUMP
(12) BERTELSON-CLARK DAM & DITCH (NOT IN USE)
(13) NEWTON PUMPS & DITCHES
(14) COTTONWOOD COUNTRY CLUB PUMP-PIPE LINE & SPRINKLERS
(15) HIGHLAND PARK PUMP-PIPE LINE & STORAGE TANK
(16) ZENTNER DAM & DIKE
(17) MINOT SAND & GRAVEL PUMP & PIPE LINE
(18) LATERAL 34.5C
Twp. 16 North
Rge. 55 East
Drafted by Norman Thompson

T16


Yellowstone River
N.P.R.R.
FOURTH STANDARD PARALLEL NORTH
BROWN DAM & DIKES
BROWN PUMP SITES (NOT IN USE)
OLD DITCH & DIKES (NOT IN USE)
EAST
MERIDIAN
GUIDE
FOURTEENTH
Cotton Creek
N.P.R.R.
Deer Creek
HOT BAR LAND & CATTLE CO. DAM-DIKES & DITCHES
Yellowstone River
OLD GLENDIVE AIRPORT
GLENDIVE LAGOON
Glendive
N.P.R.R.
EROSION DIKES
Graveyard Coulee
Creek
Griffith Creek
T. 16 N-R. 55 E
T. 15 N-R. 55 E
Graveyard Coulee
N.P.R.R.
Glendive Creek
Krug Creek
LEGEND
Private Irrigation
Twp. 16 North
Rge. 56 East
Drafted by June Virog
T17



LEGEND

Private Irrigation

WIBAUX

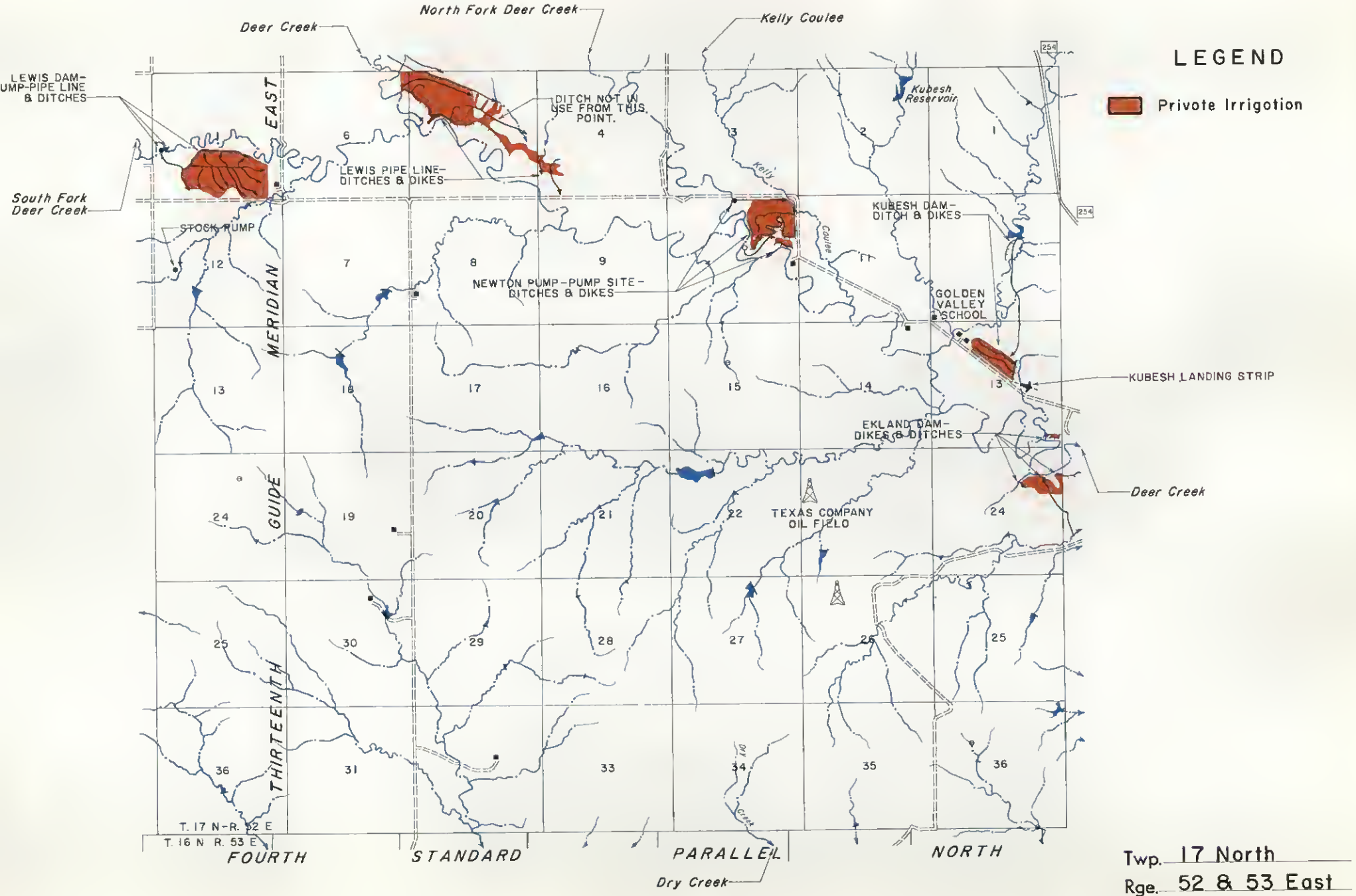
COUNTY

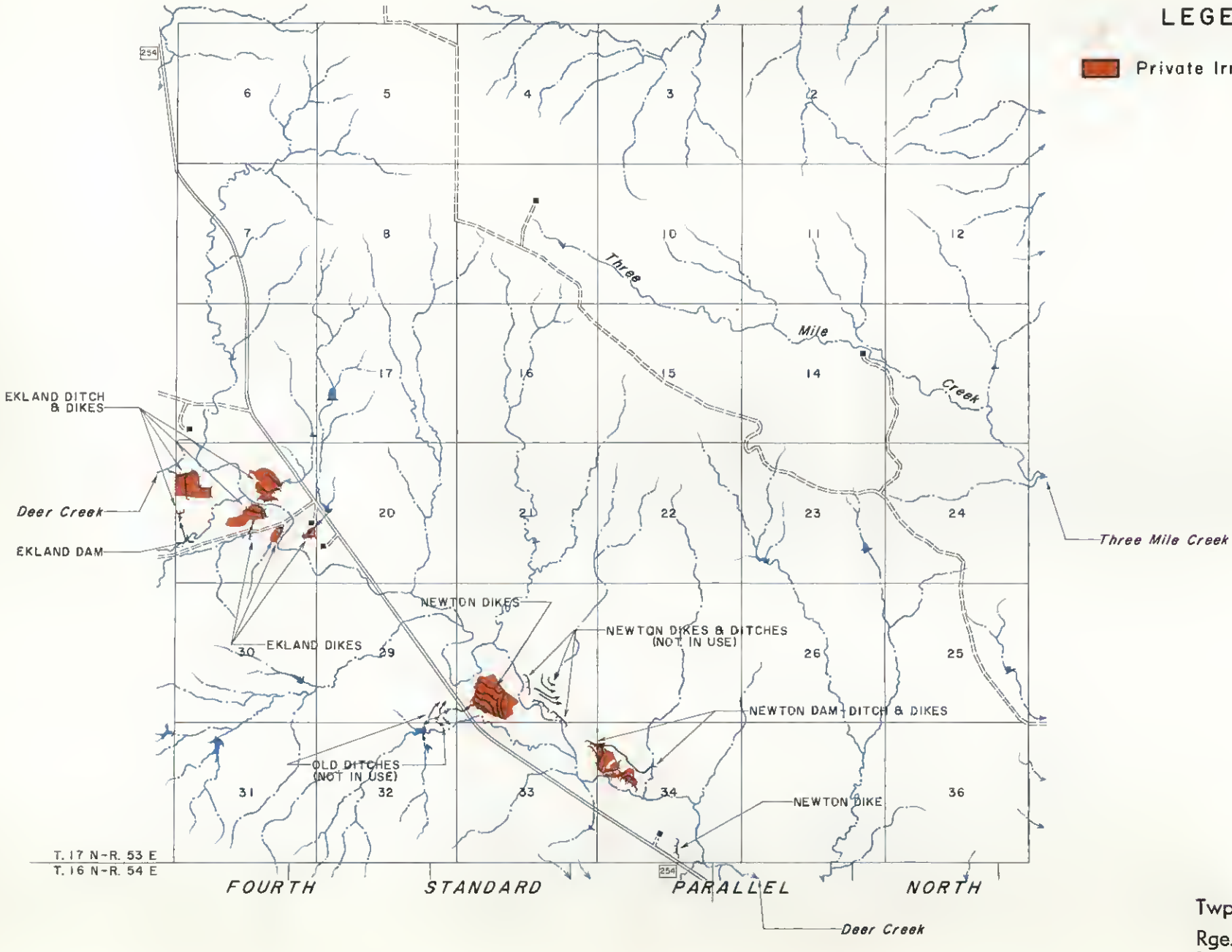
Twp. 16 North

Rge. 58 East

Drafted by James W. Sharkey

T18

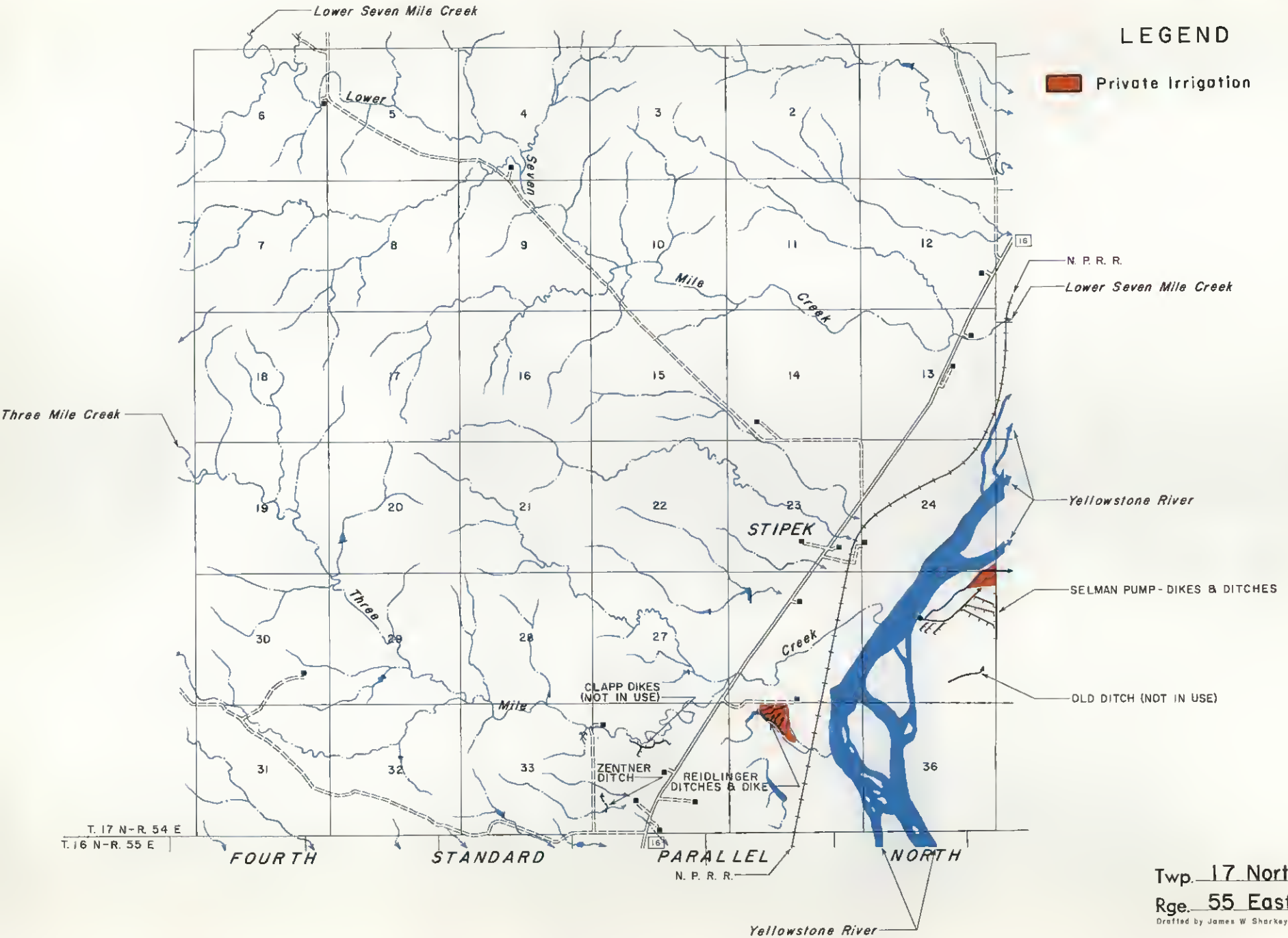

Deer Creek
North Fork Deer Creek
Kelly Coulee
LEWIS DAM-PUMP-PIPE LINE & DITCHES
South Fork Deer Creek
DITCH NOT IN USE FROM THIS POINT.
Kubesh Reservoir
LEWIS PIPE LINE-DITCHES & DIKES
STOCK PUMP
KUBESH DAM-DITCH & DIKES
NEWTON PUMP-PUMP SITE-DITCHES & DIKES
GOLDEN VALLEY SCHOOL
KUBESH LANDING STRIP
EKLAND DAM-DIKES & DITCHES
Deer Creek
TEXAS COMPANY OIL FIELD
Dry Creek
MERIDIAN EAST
GUIDE
THIRTEENTH
T. 17 N-R. 52 E.
T. 16 N. R. 53 E.
FOURTH STANDARD PARALLEL NORTH
LEGEND
Privote Irrigotion
Twp. 17 North
Rge. 52 & 53 East
Drafted by June Virog



Twp. 17 North
Rge. 54 East

Drafted by June Virag

T20



LEGEND

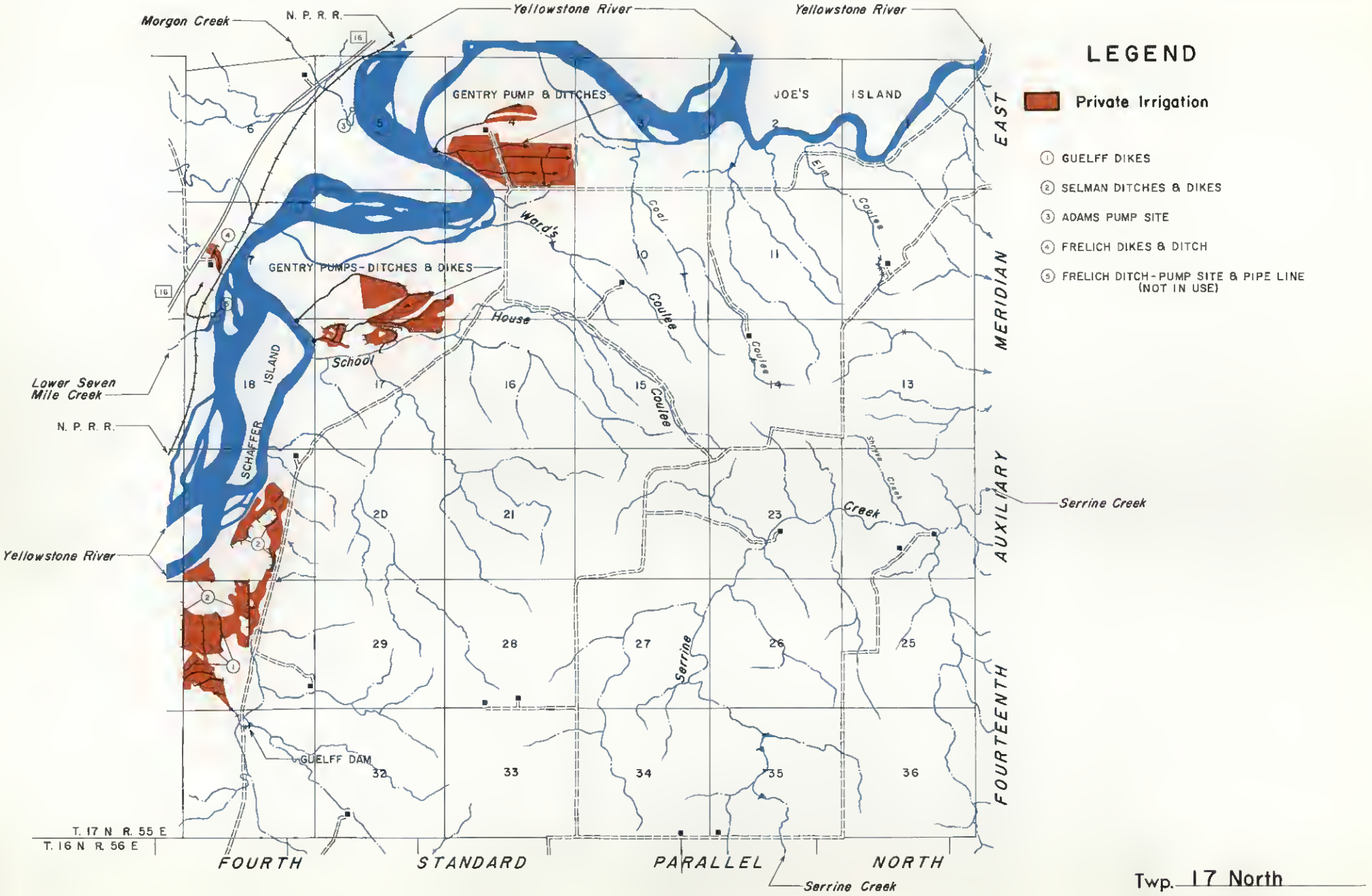
Private Irrigation

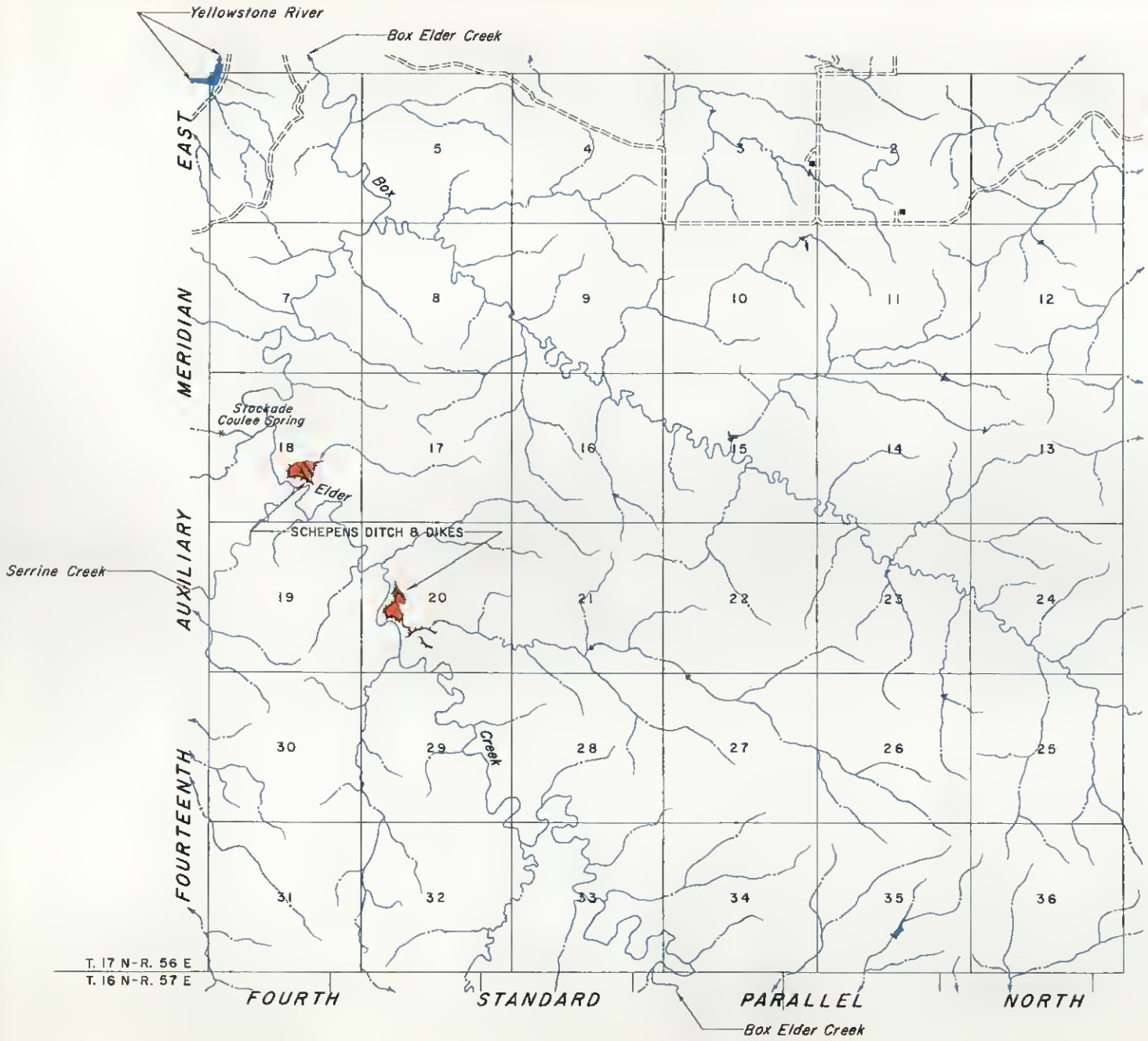
Twp. 17 North

Rge. 55 East

Drafted by James W Sharkey

T21


Morgon Creek
N. P. R. R.
Yellowstone River
Yellowstone River
GENTRY PUMP & DITCHES
JOE'S
ISLAND
EAST
MERIDIAN
GENTRY PUMPS-DITCHES & DIKES
Ward's
Coal
Coulee
House
School
Lower Seven Mile Creek
N. P. R. R.
SCHAFFER
ISLAND
Yellowstone River
Serrine Creek
AUXILIARY
FOURTEENTH
GUELFF DAM
T. 17 N R. 55 E
T. 16 N R. 56 E
FOURTH
STANDARD
PARALLEL
NORTH
Serrine Creek
LEGEND
Private Irrigation
1 GUELFF DIKES
2 SELMAN DITCHES & DIKES
3 ADAMS PUMP SITE
4 FRELICH DIKES & DITCH
5 FRELICH DITCH-PUMP SITE & PIPE LINE (NOT IN USE)
Twp. 17 North
Rge. 56 East
Drafted by James W. Sharkey
T22



LEGEND

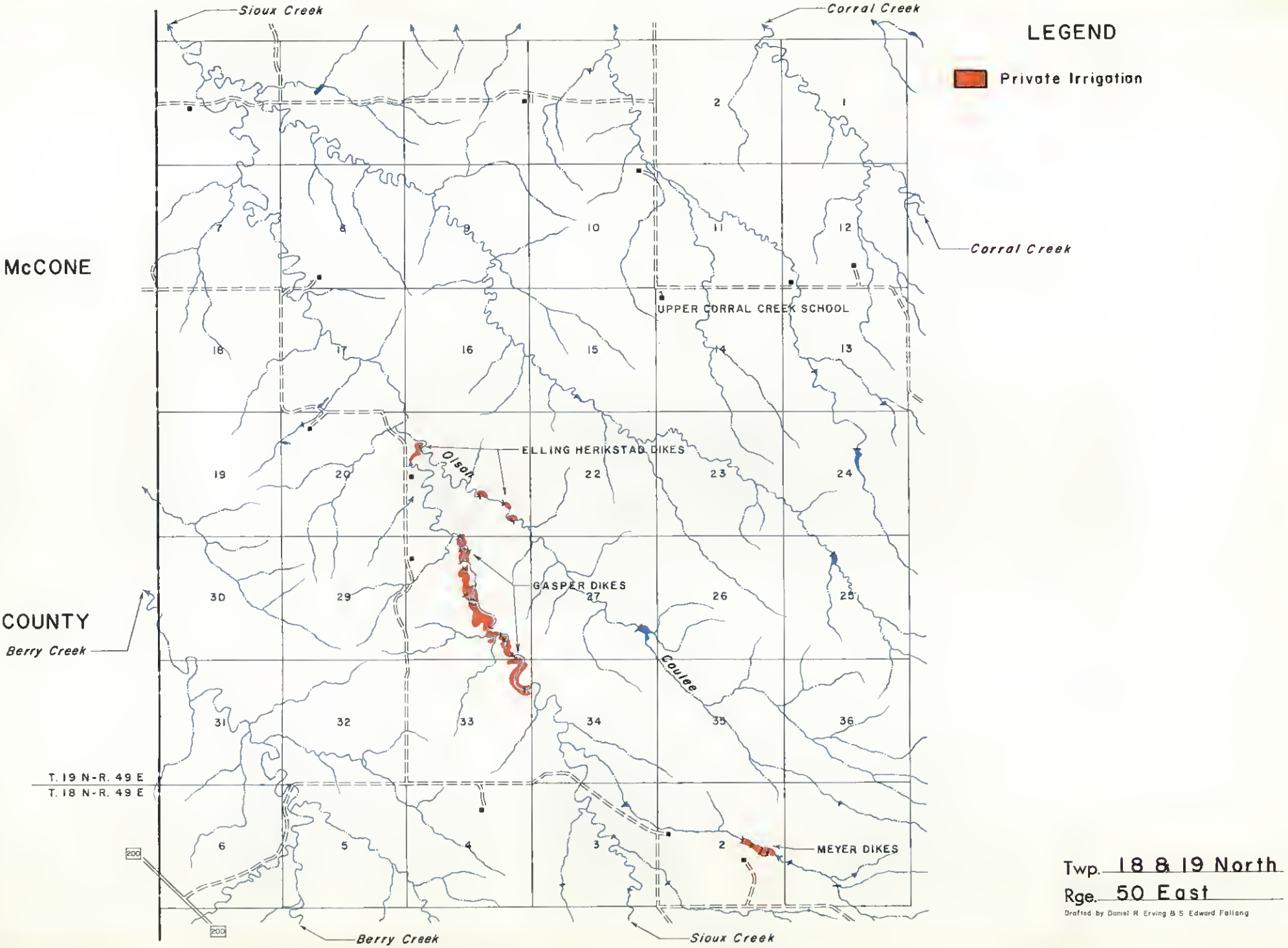
Private Irrigation

Twp. 17 North

Rge. 57 East

Drafted By Hugh D. Greanup

T23

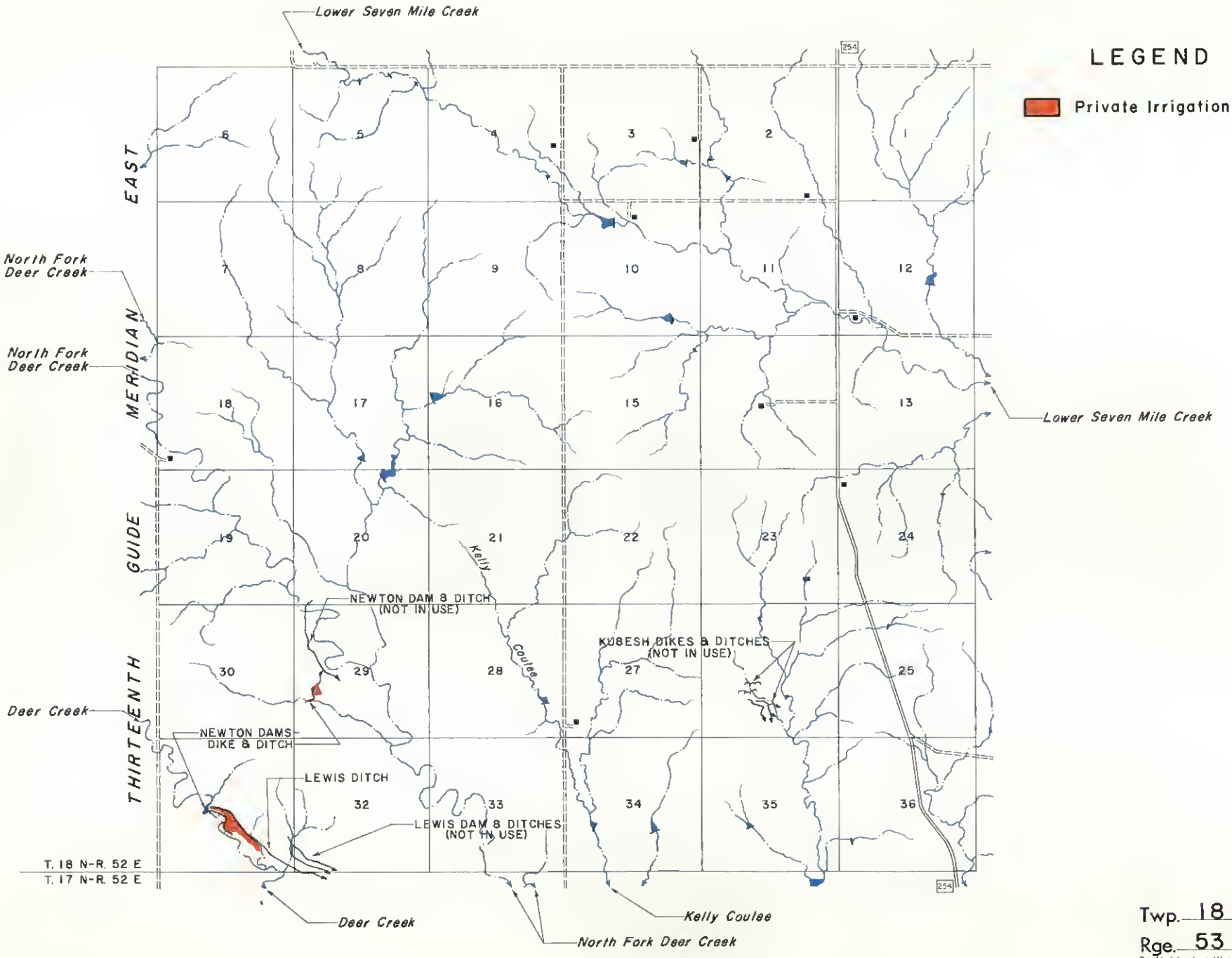


Twp. 18 & 19 North

Rge. 50 East

Drafted by Daniel R Erving & S Edward Fallang

T24



LEGEND

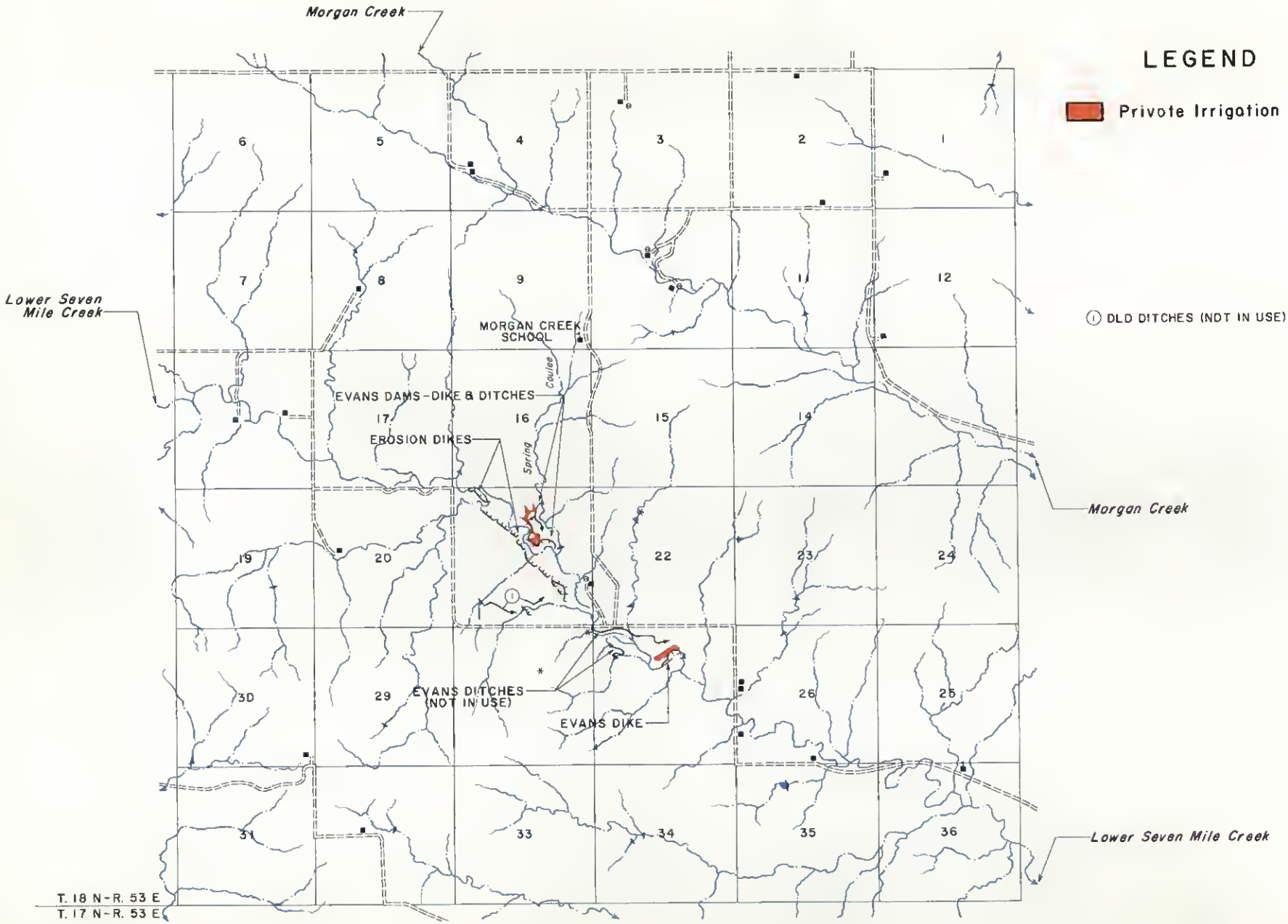
Private Irrigation

Twp. 18 North

Rge. 53 East

Drafted by June Virag

T25



LEGEND

Private Irrigation

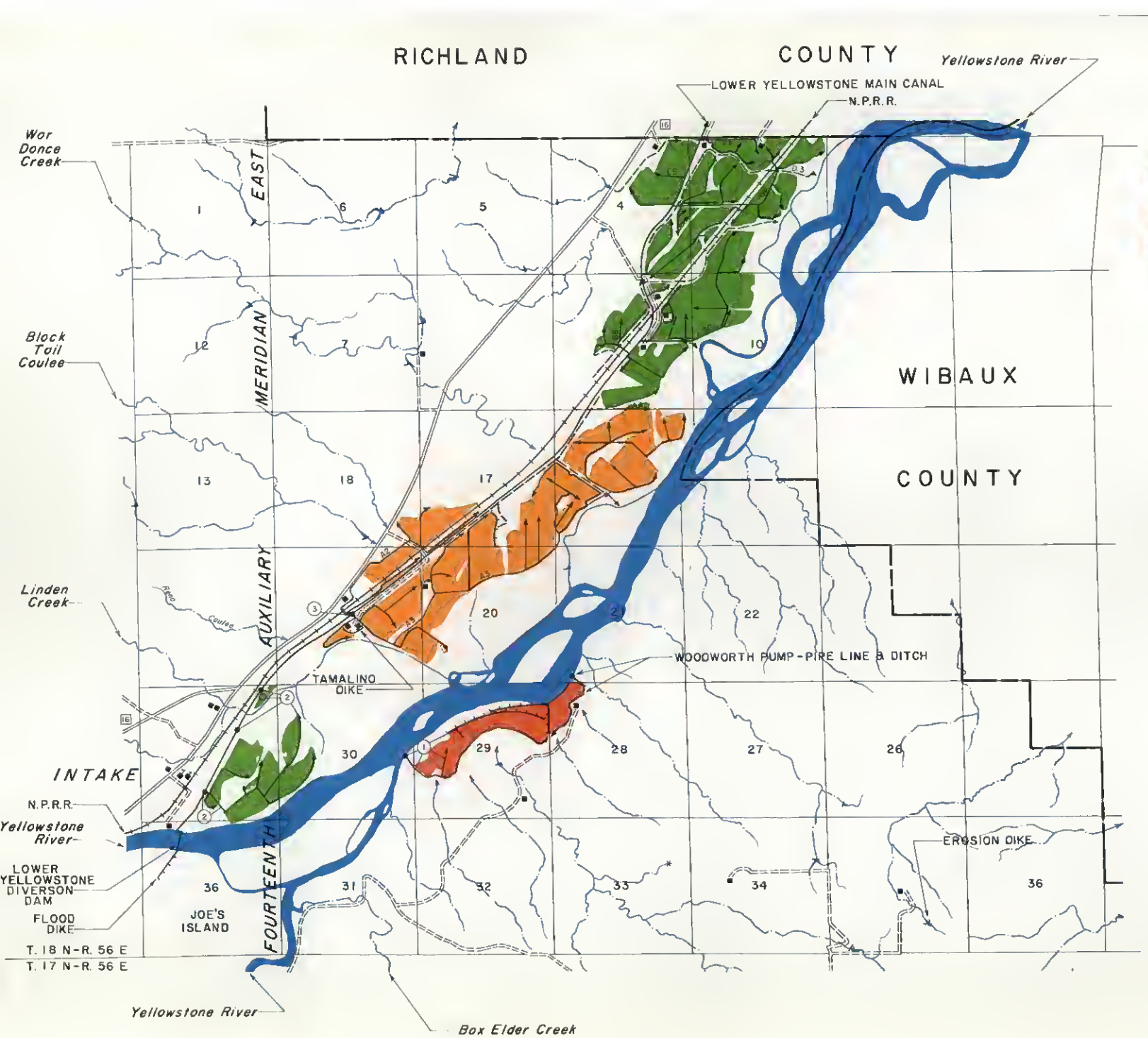
① DLD DITCHES (NOT IN USE)

Twp. 18 North

Rge. 54 East

Drafted by June Vitog

T26



LEGEND

- Lower Yellowstone Proj.
- Intake Project
- Private Irrigation

① TEMPLE PUMP-DIKES & DITCHES

② TAGUE PUMPS-SPRINKLERS & DITCHES

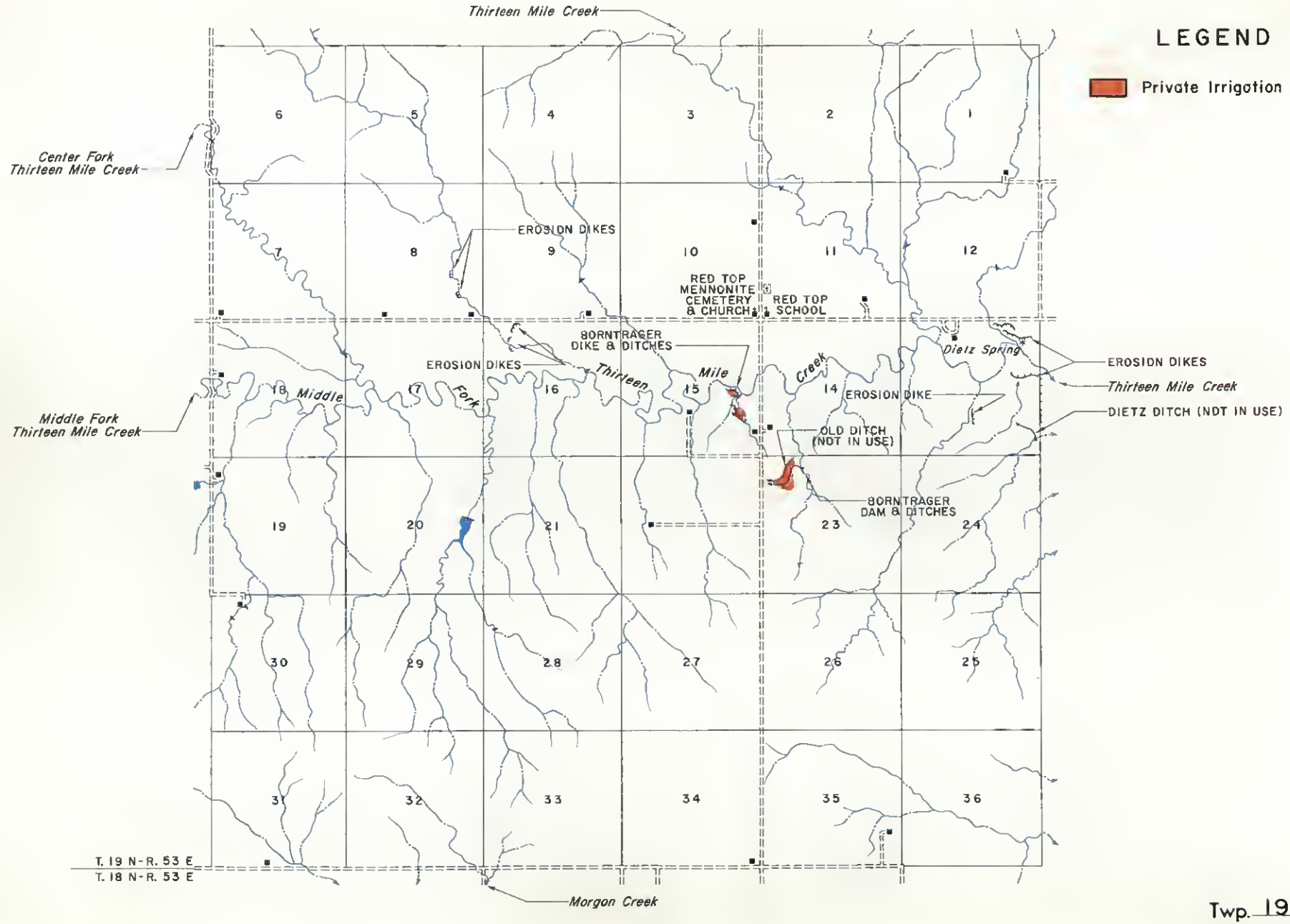
③ INTAKE PROJECT PUMPING PLANT

Twp. 18 North

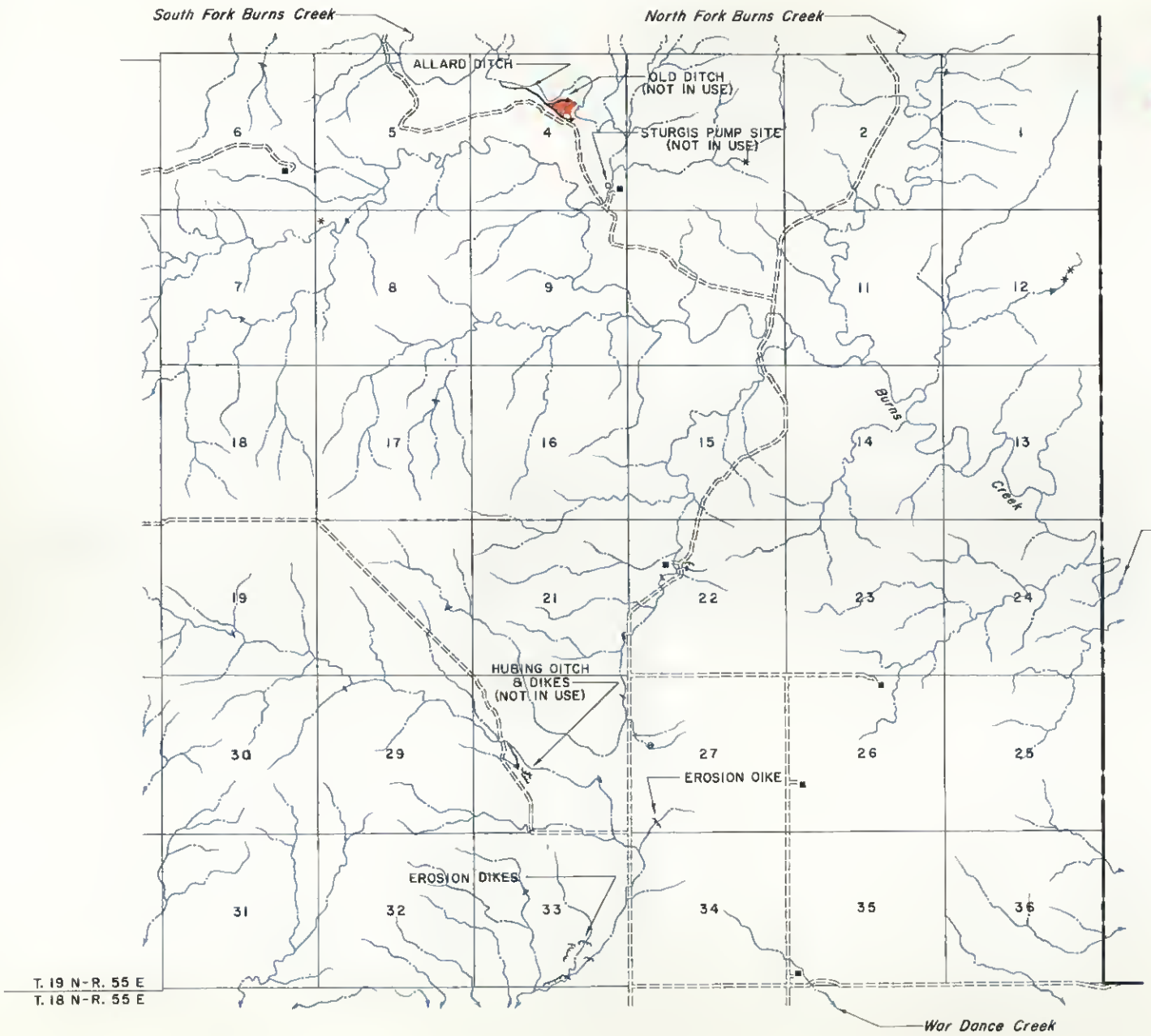
Rge. 56 & 57 East

Drafted by June Virag

T27


Thirteen Mile Creek
Center Fork Thirteen Mile Creek
Middle Fork Thirteen Mile Creek
EROSION DIKES
RED TOP MENNONITE CEMETERY & CHURCH
RED TOP SCHOOL
BORNTRAGER DIKE & DITCHES
EROSION DIKES
Middle Fork Thirteen Mile Creek
Dietz Spring
EROSION DIKES
Thirteen Mile Creek
EROSION DIKE
DIETZ DITCH (NOT IN USE)
OLD DITCH (NOT IN USE)
BORNTRAGER DAM & DITCHES
T. 19 N-R. 53 E
T. 18 N-R. 53 E
Morgan Creek
LEGEND
Private Irrigation
Twp. 19 North
Rge. 54 East
Drafted By Hugh O. Greenup

T28



LEGEND

Private Irrigation

RICHLAND

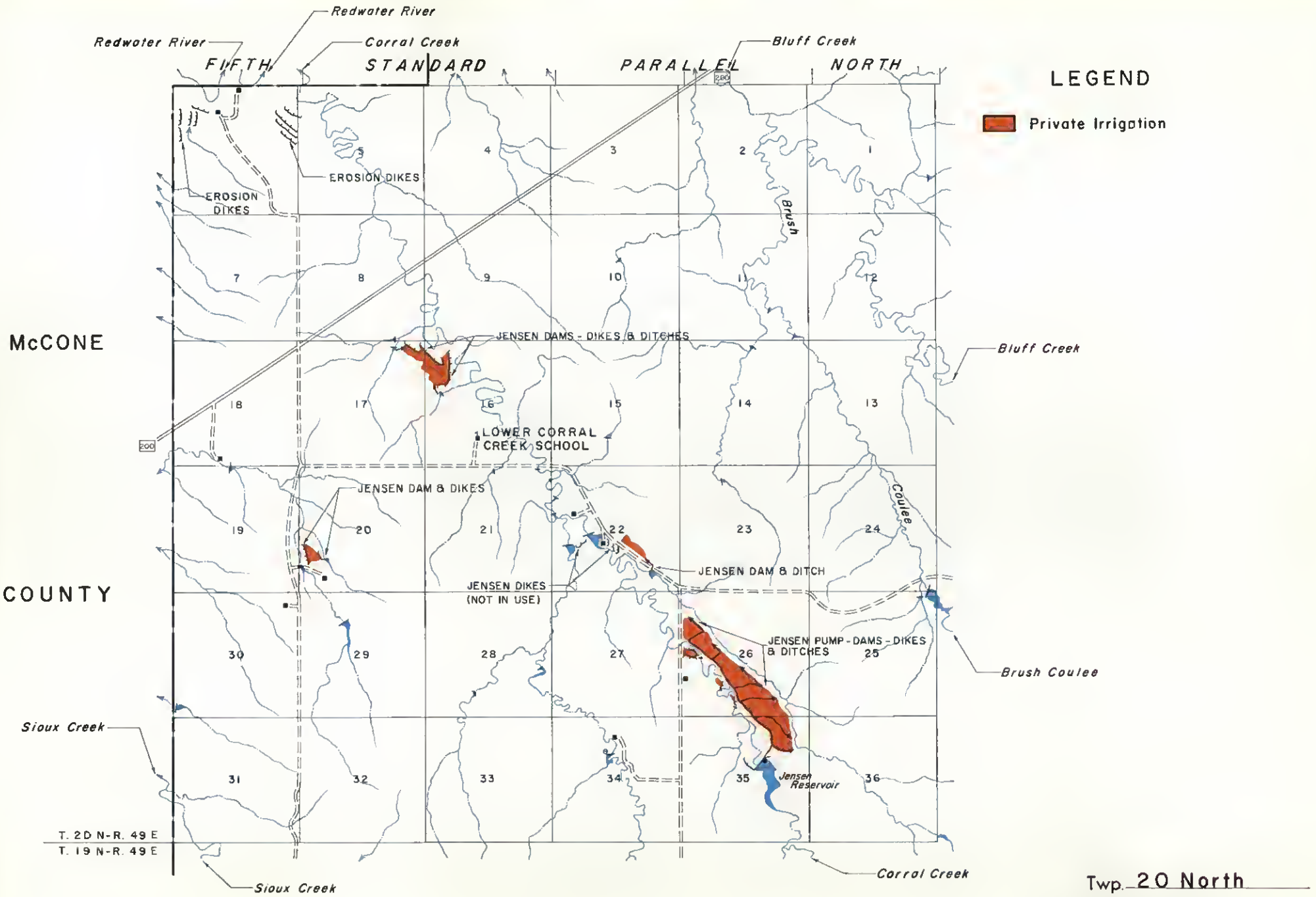
COUNTY

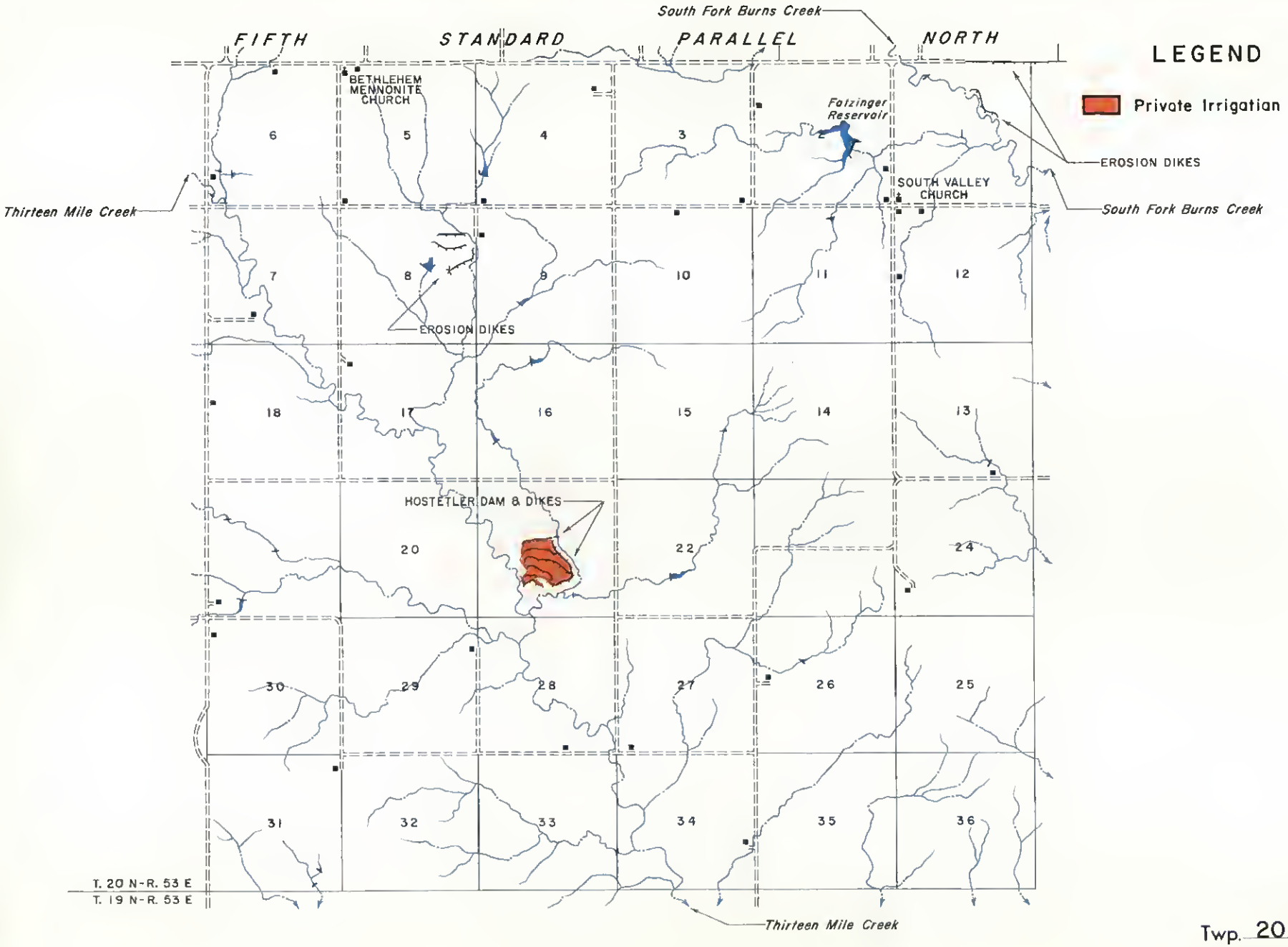
Twp. 19 North

Rge. 56 East

Drafted By Hugh D. Greenup

T29

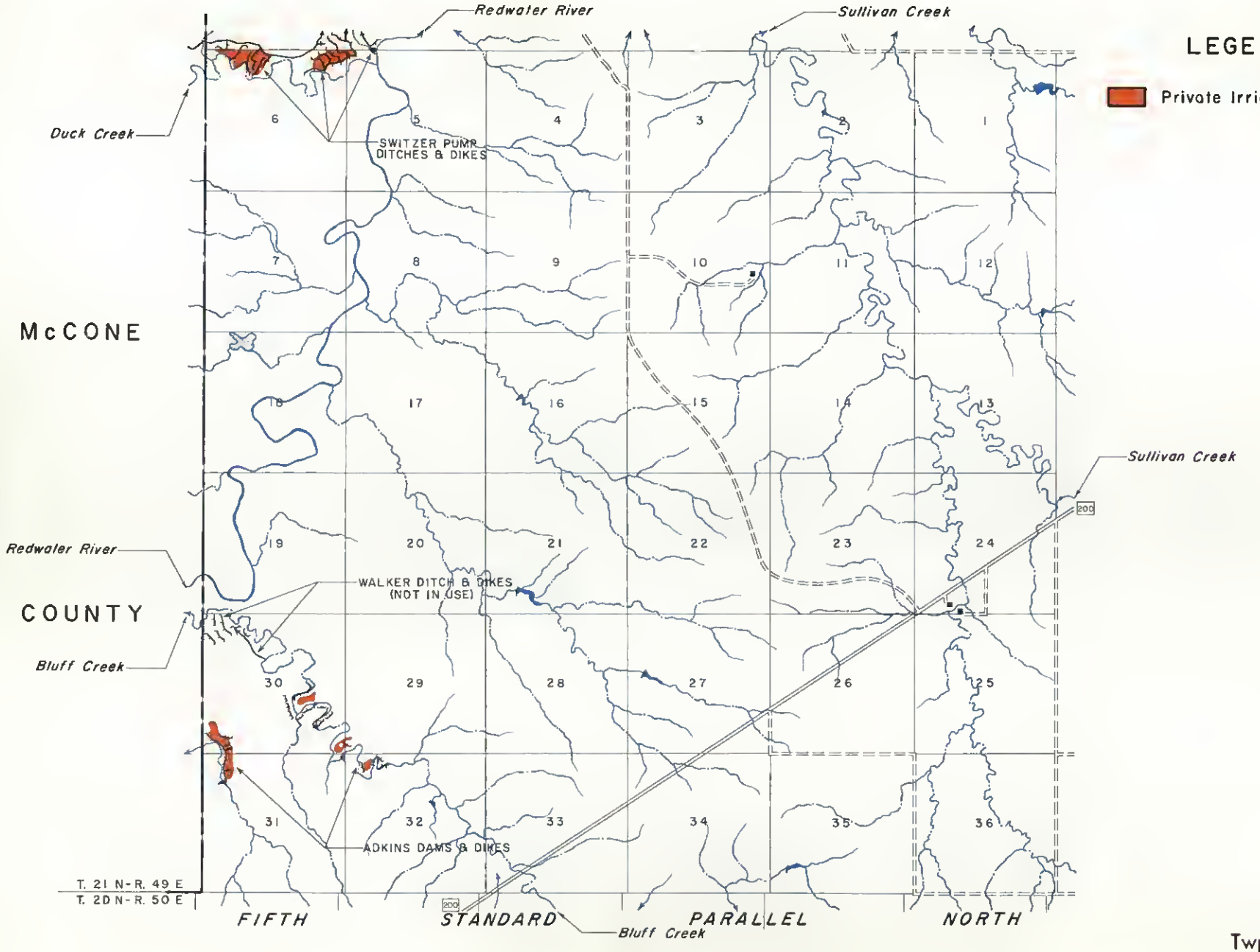

Redwater River
Redwater River
Corral Creek
Bluff Creek
FIFTH STANDARD PARALLEL NORTH
LEGEND
Private Irrigation
EROSION DIKES
EROSION DIKES
Brush
JENSEN DAMS - DIKES & DITCHES
Bluff Creek
McCONE
LOWER CORRAL CREEK SCHOOL
JENSEN DAM & DIKES
Coulee
JENSEN DAM & DITCH
JENSEN DIKES (NOT IN USE)
JENSEN PUMP - DAMS - DIKES & DITCHES
Brush Coulee
COUNTY
Sioux Creek
Jensen Reservoir
T. 20 N-R. 49 E
T. 19 N-R. 49 E
Sioux Creek
Corral Creek
Twp. 20 North
Rge. 50 East
Drafted by Daniel R Erving & S Edward Fallong
T30



Twp. 20 North
Rge. 54 East

Drafted By Hugh D. Greenup

T31

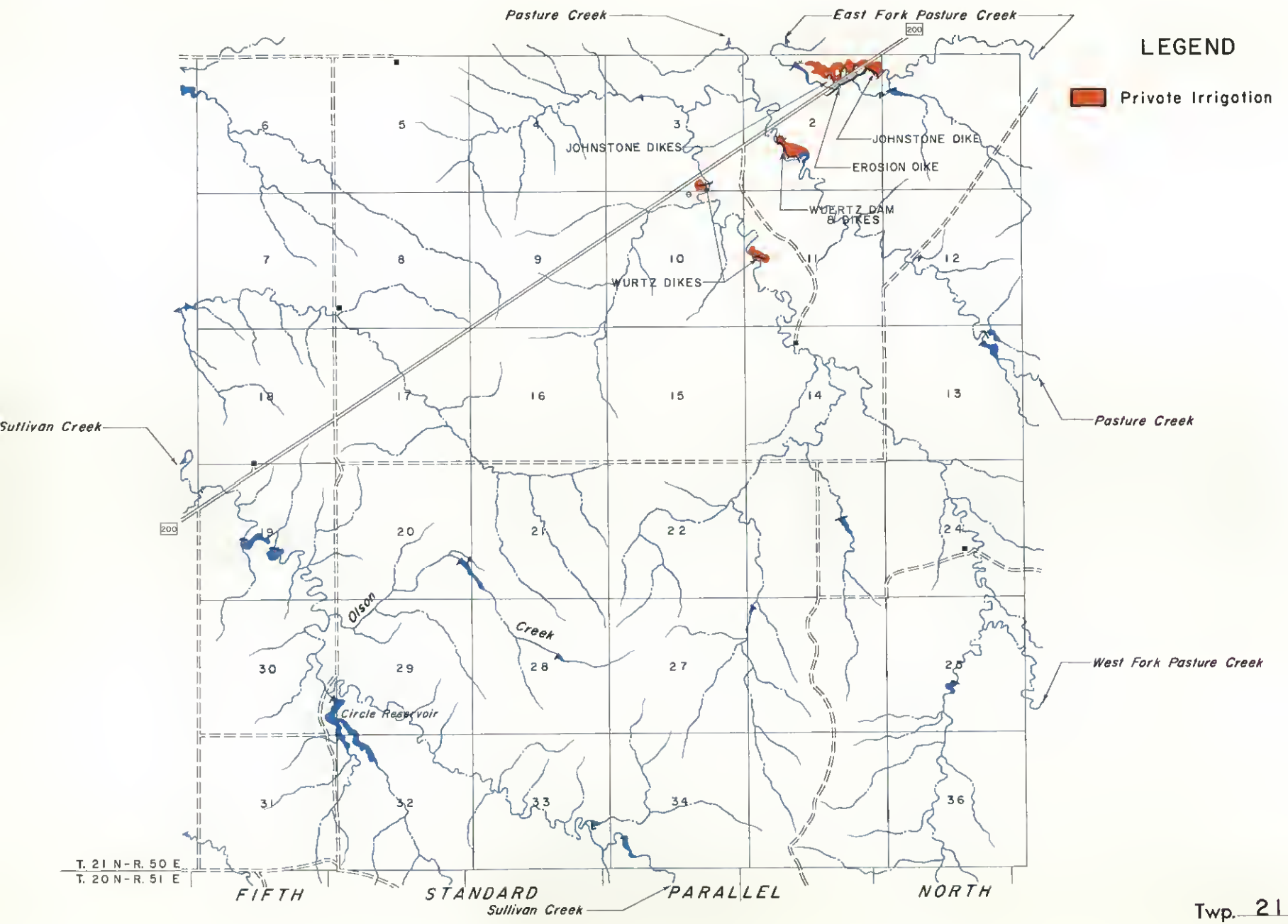


Twp. 21 North

Rge. 50 East

Drafted by Daniel R Erving

T32



LEGEND

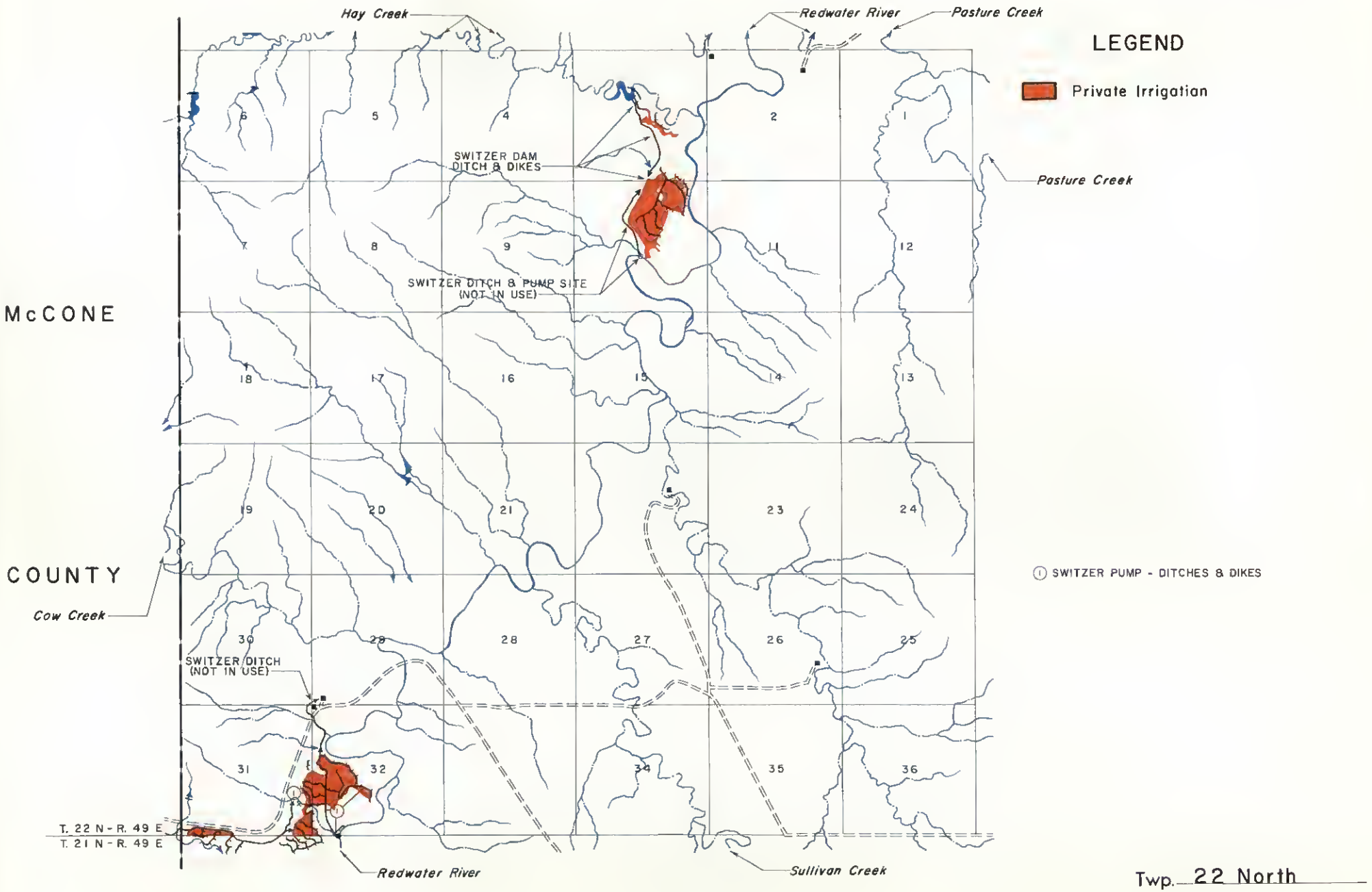
Privote Irrigotion

Twp. 21 North

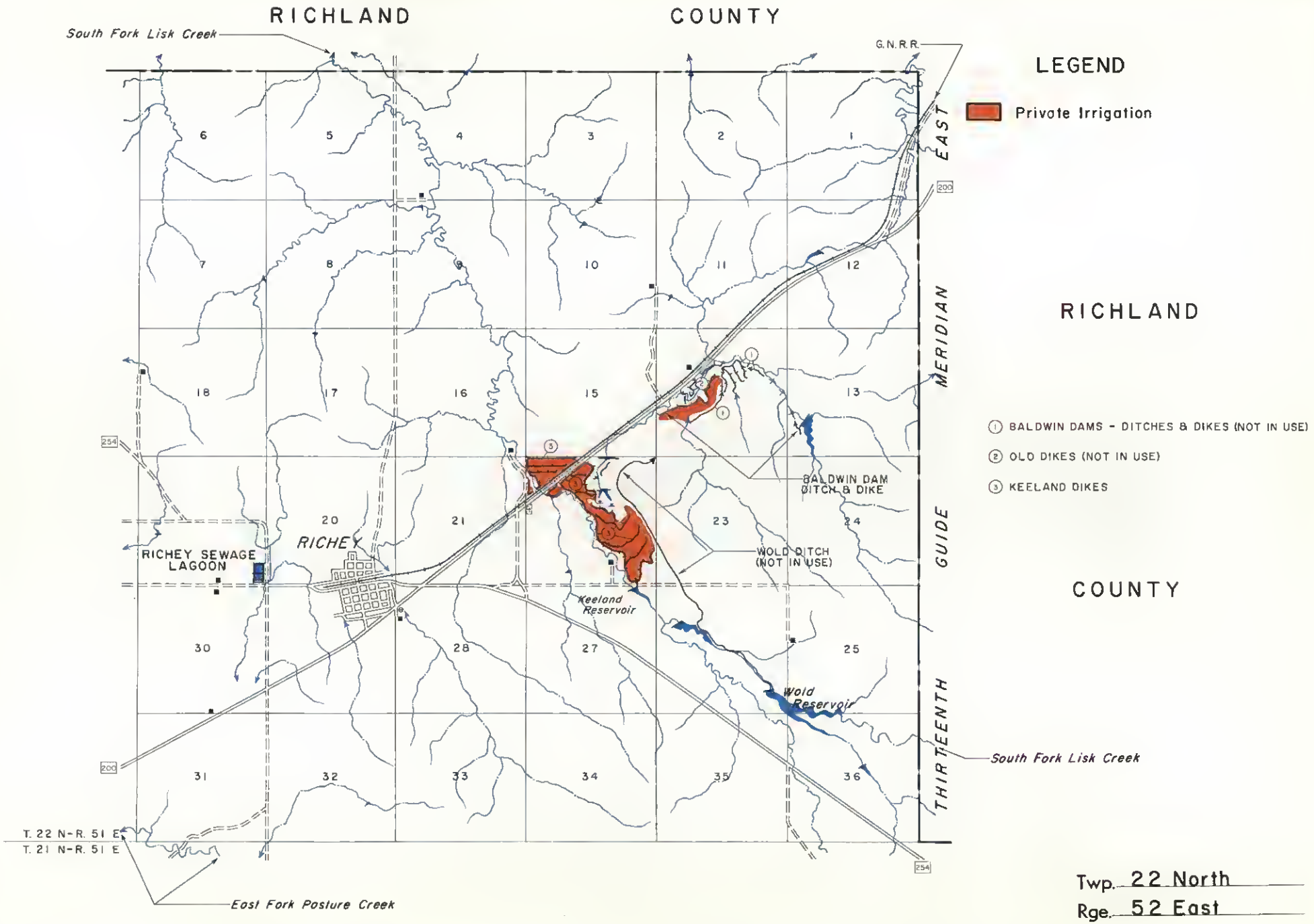
Rge. 51 East

Drafted by Daniel R Erving

T33


Hay Creek
Redwater River
Pasture Creek
LEGEND
Private Irrigation
SWITZER DAM DITCH & DIKES
Pasture Creek
SWITZER DITCH & PUMP SITE (NOT IN USE)
McCONE
COUNTY
Cow Creek
SWITZER PUMP - DITCHES & DIKES
SWITZER DITCH (NOT IN USE)
T. 22 N - R. 49 E
T. 21 N - R. 49 E
Redwater River
Sullivan Creek
Twp. 22 North
Rge. 50 East
Drafted by Daniel R. Erving

T34


RICHLAND COUNTY
South Fork Lisk Creek
G.N.R.R.
EAST
MERIDIAN
GUIDE
THIRTEENTH
200
254
6
5
4
3
2
1
7
8
9
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18
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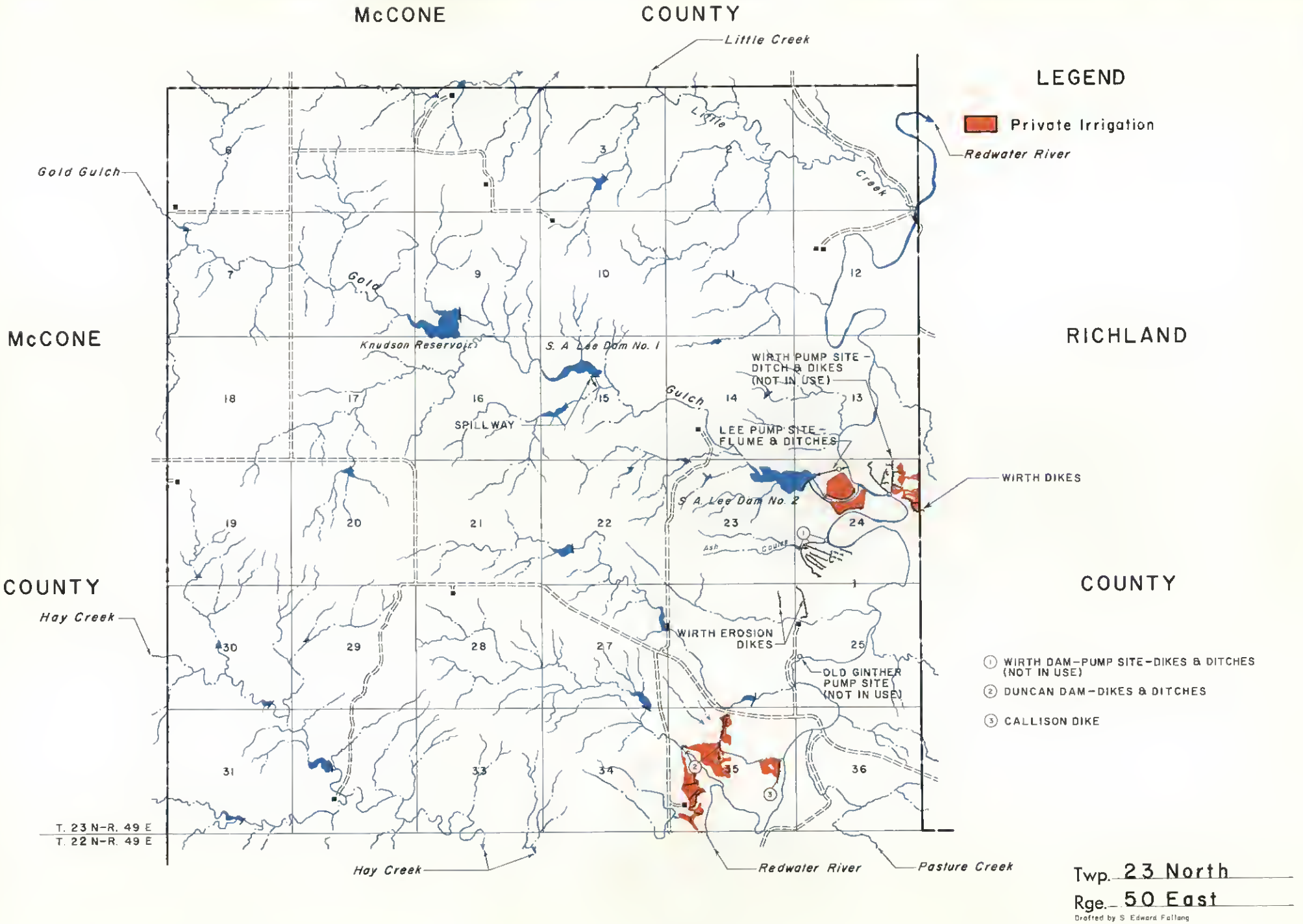
36
RICHEY
RICHEY SEWAGE LAGOON
BALDWIN DAM DITCH & DIKE
WOLD DITCH (NOT IN USE)
Keeland Reservoir
Wold Reservoir
South Fork Lisk Creek
T. 22 N-R. 51 E
T. 21 N-R. 51 E
East Fork Posture Creek
LEGEND
Private Irrigation
RICHLAND
COUNTY
① BALDWIN DAMS - DITCHES & DIKES (NOT IN USE)
② OLD DIKES (NOT IN USE)
③ KEELAND DIKES
Twp. 22 North
Rge. 52 East
Drafted by Daniel R Erving

T35


McCONE COUNTY
Little Creek
LEGEND
Private Irrigation
Redwater River
Gold Gulch
Little Creek
Gold Creek
McCONE
RICHLAND
Knudson Reservoir
S. A. Lee Dam No. 1
WIRTH PUMP SITE - DITCH & DIKES (NOT IN USE)
SPILLWAY
LEE PUMP SITE - FLUME & DITCHES
WIRTH DIKES
S. A. Lee Dam No. 2
Ash Coulee
COUNTY
Hay Creek
WIRTH EROSION DIKES
OLD GINTHER PUMP SITE (NOT IN USE)
1 WIRTH DAM-PUMP SITE-DIKES & DITCHES (NOT IN USE)
2 DUNCAN DAM-DIKES & DITCHES
3 CALLISON DIKE
T. 23 N-R. 49 E
T. 22 N-R. 49 E
Hay Creek
Redwater River
Pasture Creek
Twp. 23 North
Rge. 50 East
Drafted by S. Edward Fellang

T36

MEMBERS OF THE WATER RESOURCES DIVISION

February, 1971

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Ralph Saunders, Assistant Director

Bernece Arts, Secretary
Janice Schutt, Clerk-Typist
Dona Linn, Clerk-Typist

Hans L. Bille
Coordinator

James E. Halloran
Groundwater Supervisor

D. A. Pouliot
Coordinator

Don Breiby
Asst. Groundwater Supervisor

Robert Poad, Office Supervisor
John Serquina
June Virag
Ed Fallang
John McBee
Dan Nelson
Gary Wiseman
Hugh Greenup

Duane Smith, Field Supervisor
Ron Haynes
Jim Rehbein
Silvio Rodriguez
Warren Fisher
Tom Reynolds
Jim Cusick

Assisted by: Robert Peter, Microfilm Specialist